GTE-ERS
TECHNICAL LIBRARY
03442

NORTHEAST ELECTRONICS

A DIVISION OF NORTHERN TELECOM, INC.

INSTRUCTION MANUAL

MODEL 7001
T1 FAULT LOCATOR

No. A7001-00-600 ISSUE 4 DATE NOV 1975

PRINTED IN U.S.A.

Airport Rd., Concord, N.H. 03301 • (603) 224-6521 • TELEX 94-3453

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_11113

NORTHEAST ELECTRONICS

A DIVISION OF NORTHERN TELECOM, INC.

INSTRUCTION MANUAL

MODEL 7001
T1 FAULT LOCATOR

No. A7001-00-600 ISSUE 4 DATE NOV 1975

PRINTED IN U.S.A.

Airport Rd., Concord, N.H. 03301 • (603) 224-6521 • TELEX 94-3453

2.0C-7001-1175

PROPRIETARY NOTICE

NOT APPLICABLE UNDER CONTRACT AFT-154D

The information contained in this publication is the property of Northeast Electronics, a division of Northern Telecom, Incorporated, and may not be reproduced or used for manufacturing purposes or dislcosed to third parties without the written permission of Northeast Electronics.

WARRANTY

Northeast Electronics, a division of Northern Telecom, Incorporated, warrants all products manufactured or sold by Northeast Electronics to be free from defects in materials and workmanship, subject to the following terms and provisions.

Northeast Electronics' obligations under this warranty are limited to repairing, adjusting, or replacing at our option, with reasonable promptness, any Northeast Electronics product which shall within twelve (12) months after delivery to the original purchaser, and after normal and proper usage, prove to be defective on Northeast Electronics inspection, provided that the purchaser shall have reasonably inspected products when received and notified Northeast Electronics of any apparent defects discovered within fifteen (15) days of receipt of shipment. Northeast Electronics shall not be liable for any manufacturing costs of the buyer, lost profits or good will of the buyer, or any other special or consequential damages sustained or expenses incurred by the buyer by reason of the use or sale of any defective Northeast Electronics product.

No products may be returned to Northeast Electronics except with our written permission. After receiving Northeast Electronics factory authorization, material requiring repair or replacement should be sent prepaid to the factory accompanied by a written statement setting forth as completely as possible the defects and the conditions under which they occurred. Material delivered by Northeast Electronics shall not be considered defective if it satisfactorily fulfills the buyer's performance requirements and/or is in accordance with approved samples. Northeast Electronics' obligations on performance of products delivered shall be limited to complying with specifications accompanying a purchase order or wtih published specifications on standard catalog items. This warranty does not extend to any Northeast Electronics products which have been subject to misuse, neglect, accidents or improper installation or applications, nor shall it extend to units which have been repaired or substantially altered outside the Northeast Electroncis factory, nor to any associated instruments, equipments or apparatus. This warranty is in lieu of all other warranties, express or implied.

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1	DESCRIPTION	1–1
	1.1 Purpose of the Equipment	1–1
2	SPECIFICATIONS	2–1
3	OPERATING INSTRUCTIONS	3–1
	3.1 Front Panel Controls	3–1
	3.2 Operation	3–1
4	CIRCUIT DESCRIPTION	4–1
	4.1 General Description	4–1
5	MAINTENANCE AND CALIBRATION	5–1
	5.1 Introduction	5–1
	5.2 Operational Test Procedure	5–1
6	ELECTRONIC PARTS LIST	6–1
	6.1 Introduction	6–1
7	SCHEMATIC DIAGRAMS	7–1
	7.1 Introduction	7–1

LIST OF ILLUSTRATIONS

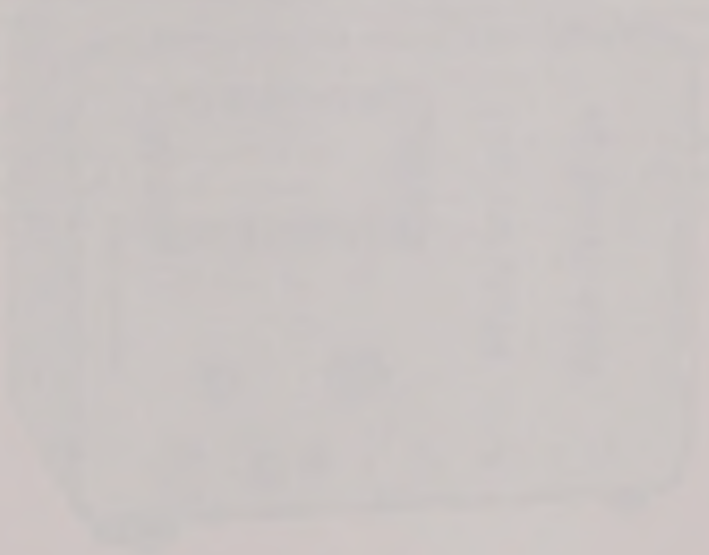
FIGURE	TITLE	PAGE
1–1	Model 7001 T1 Fault Locator Front View	1–0
3–1	Model 7001 Front Panel Controls, Indicators, and Connectors	3–3
4–1	Model 7001 Block Diagram	4–1
4–2	Signal Generator Timing Diagram	4–2
4–3	Model 7001 Pulse Output Patterns	4–4
6–1	Model 7001 Power Supply Card 1, Component Location Diagram	6–2
6–2	Model 7001 Filter Detector Card 2, Component Location Diagram	6–5
6–3	Model 7001 Line Filter Selector Card 3, Component Location Diagram	6–7
6–4	Model 7001 Signal Generator Card 4, Component Location Diagram	6–9
6–5	Model 7001 Signal Generator Switch S1 and Board Assembly Component Location Diagram	6–10
6–6	Model 7001 Interconnection Board Assembly Component Location Diagram	6–11
6–7	Model 7001 Line Filter Selector Switch S2 and Board Assembly Component Location Diagram	6–12
6–8	Model 7001 Line Noise Filter Board Assembly Component Location Diagram	6–13

List of Illustrations (cont)

FIGURE	TITLE	PAGE
7–1	Model 7001 Line Filter Selection Circuit Schematic Diagram	7–2
7–2	Model 7001 Overall Interconnection Schematic Diagram	7–3
7–3	Model 7001 Signal Generator and Switch S1 Circuit Schematic Diagram	7–4
7–4	Model 7001 Power Supply Circuit Schematic Diagram	7–5
7–5	Model 7001 Filter Detector Circuit Schematic Diagram	7–6

LIST OF TABLES

TABLE	TITLE	PAGE
5–1	Pulse Period Per Pushbutton Selection	5–2
5–2	Line Filter Frequencies	5–3
6–1	List of Manufacturers	6–1
6–2	Model 7001 Overall Assembly Parts List	6–2
6–3	Model 7001 Power Supply Card 1, E95640, Parts List	6–3
6–4	Model 7001 Filter Detector Card 2, E95646, Parts List	6–4
6–5	Model 7001 Line Filter Selector Card 3, E95645, Parts List	6–6
6–6	Model 7001 Signal Generator Card 4, E95492, Parts List	6–8
6–7	Model 7001 Signal Generator Switch S1 and Board Assembly Parts List	6–10
6–8	Model 7001 Interconnection Board Assembly Parts List	6–11
6–9	Model 7001 Line Filter Selector Switch S2 and Board Assemblies, E95643 and E95644, Parts List	6–12
6–10	Model 7001 Line Noise Filter Board Assembly, E95284, Parts List	6–13
6–11	Model 7001 Level dB Attenuator Switch S3 Assembly Parts List	6–13



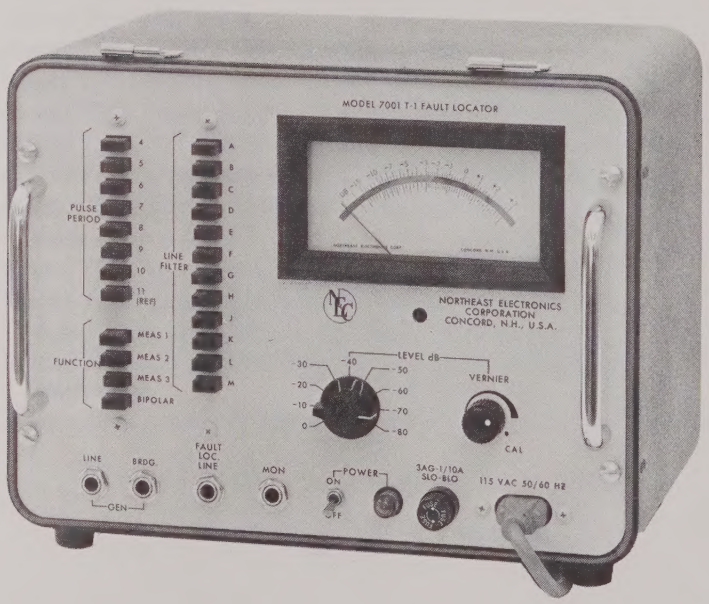


Figure 1–1. Model 7001 T1 Fault Locator Front View.

DESCRIPTION

1.1 PURPOSE OF THE EQUIPMENT. The T1 Fault Locator is a specialized test set for trouble-shooting a failed T1 Repeater Line to determine the point of failure. It contains a 1.544 megabit pulse rate signal generator adjustable to any of four modes of operation, a range of pulse densities, a modulating signal adjusted to one of 12 modulating frequencies spaced across the voice band, and a sensitive voice-frequency selective detector pretuned to the modulating signal frequency.

1.2 Of the four modes of operation, the normal mode, switch position MEAS 1, sends a deliberate bipolar violation following each pair of bipolar pulses and reverses the polarity of the violations at the selected voice-frequency rate. The second and third modes, MEAS 2 and MEAS 3, are the same as the normal mode except that in the MEAS 2 position only negative polarity violations are transmitted and in the MEAS 3 position, only positive polarity violations are transmitted, in both cases, in bursts occurring at the selected voice-frequency rate. The fourth mode, BIPOLAR, sends no bipolar violations at all and can be used as a normal bipolar signal of adjustable pulse density for test purposes.

1.3 The signal generator mode, pulse density, and voice frequency selection functions are controlled by pushbutton switches. The received level of the voice-frequency signal transmitted from a normally operating line repeater over the voice frequency fault locating line is determined from the setting of a rotary switch in combination with the reading of a panel meter. Received signal levels from +3 to −95 dBm are indicated directly.

1.4 Jacks are provided for connecting to the T1 repeater line, to an external office error detector, to the fault locating line, and for monitoring the fault locating line.

1.5 The set is portable and can be operated in either the vertical or the horizontal position. The cover is removable and provides storage for the power cord.

SPECIFICATIONS

SIGNAL GENERATOR

Clock Frequency: 1.544 MHz, ±200 Hz

Operating modes:

MEAS 1 — One bipolar pulse pair per selected pulse period with one bipolar violation alternating from positive to negative at a selected audio frequency rate.

MEAS 2 — One bipolar pulse pair per selected pulse period with one negative bipolar violation alternately on and off at a selected audio frequency rate.

MEAS 3 — One bipolar pulse pair per selected pulse period with one positive bipolar violation alternately on and off at a selected audio frequency rate.

BIPOLAR — One bipolar pulse pair per selected pulse period.

Pulse Periods: 4 to 11 time slots.

AUDIO FREQUENCIES

Switch Pos.	Freq. ±2%
A	832
B	928
C	1048
D	1206
E	1340
F	1508
G	1722
H	2008
J	2193
K	2413
L	2680
M	3017

Pulse Amplitude: 3 volts ±10% into 100 ohm line

Pulse Width: 0.324 μseconds ±10%

SELECTIVE DETECTOR

Sensitivity: +3 to –95 dBm from 900 ohm line

Audio Frequencies: mid-band frequencies same as Signal Generator

Pulse Period Normalizing Pads:

Pulse Period	Loss dB
11	.0
10	0.8
9	1.8
8	2.8
7	4.0
6	5.3
5	6.8
4	8.8

Band Width: 6% at 3 dB points

Rejection: 20 dB at 10% points

POWER REQUIREMENTS: 105–135 Vac, 50/60 Hz, 8 watts

WEIGHT: 12 pounds
(5.44 kg)

SIZE: 12in. w x 8¾in. h x 10½in. d
(304.8mm w x 222.3mm h x 266.7mm d)

AMBIENT TEMPERATURE RANGE:

Operation: 0° to 50°C
(32° to 122°F)

Storage: –40° to 70°C
(–40° to 158°F)

OPERATING INSTRUCTIONS

3.1 FRONT PANEL CONTROLS (See figure 3–1.

a. PULSE PERIOD – used to control the density of the pulses transmitted. Each period contains either two or three pulses depending on the position of the FUNCTION switch. The pushbutton switches are interlocked so that only one at a time is operated. Each switch also inserts a normalizing pad in the detector to maintain constant response for varying pulse periods.

b. LINE FILTER – used to control the frequency of modulation of the signal generator and selection of the tuned detector. Each frequency corresponds to the mid-band frequency of an interrogation filter at a repeater location. The letters A through M are the letter codes of the corresponding Western Electric 598-type interrogation filters.

c. FUNCTION – pushbutton switches operated one at a time to select one of four signal generator modes to compare with the incoming signal from the fault locating line.

d. LEVEL – used to control the sensitivity of the tuned detector in 10 dB steps.

e. VERNIER – variable attenuator in tandem with LEVEL control, used to normalize meter reading for margin tests.

f. Input and output jacks are for the 310 type plugs. GEN output jacks: LINE jack for patching signal generator output to 100 ohms balanced repeater line and BRDG jack for bridging an Office Error Detector across the output. FAULT LOC LINE jack for connecting the output of the 900 ohms balanced fault locating line to the input of the selective detector. MON jack provides access to the recovered voice frequency fault locating signal for earphone listening. When using a low impedance earphone, this signal should be easily distinguishable above the background noise.

g. POWER ON/OFF – switch and indicator light, 3AG 1/10A slo-blo replaceable fuse and 3-pin connector for 115 Vac 50/60 Hz power cord.

3.2 OPERATION.

The T1 Fault Locator generates a 1.544 megabit pulse rate signal which feeds a T1 repeater line. This signal is modulated in the Fault Locator by one of 12 voice frequencies, each of which may be associated with a repaeter location. In a properly operating repeatered line, the voice frequency component of this signal is returned from the associated repeater location through a separate Fault Locating pair and is measured in the Fault Locator by a selective detector tuned to the same voice frequency. Optional modes of operation of the signal generator aid in determining partial failures of a repeater and provide an unmodulated signal for other purposes.

3.3 OPERATING PROCEDURE – Transmission Test for Locating a Total Line Failure.

NOTE

Use tip-ring-sleeve patch cords no more than 6 feet long. Use of patch cords longer than 6 feet may cause misleading results when testing for marginally operating repeaters.

a. Patch GEN LINE jack to input of repeatered line to be tested and FAULT LOC LINE jack to associated fault locating line.

b. Operate FUNCTION switch to MEAS 1; PULSE PERIOD switch to 11 (REF); VERNIER LEVEL control maximum cw to CAL position.

c. Operate the LINE FILTER switch to the frequency corresponding to the mid-band frequency of the interrogation filter at the repeater nearest the office. The frequencies corresponding to switch positions A–M are listed in Section 2.

d. Adjust the LEVEL switch for an on-scale meter reading. The expected level is approximately –65 dBm minus the loss of the fault locating line.

e. Operate the FUNCTION switch to MEAS 2. The received level should drop 4 to 8 dB.

f. Operate the FUNCTION switch to MEAS 3. The received level should be within 1 dB of the value observed in e.

g. Operate the FUNCTION switch to BIPOLAR. The received level should drop at least 10 dB from the value observed in e or f.

h. Repeat steps c through g for each repeater in turn in order of nearness to the transmitting office. For each repetition, the LINE FILTER switch is operated to the frequency corresponding to that of the interrogation filter at the desired repeater location. If the line has failed at any point, no signal (except line noise) will be returned from any repeater beyond that point. The first repeater to return no signal, therefore, is to be suspected of malfunction. If the line noise is exceptionally high, it may be due to oscillations from one or more idle lines in the same complement. If there are such idle lines, they should be eithre disabled by removing power or activated by feeding in a normal signal for the duration of the fault locating test. Such a signal can be supplied from a bridging repeater in the office, a spare terminal or another T1 Fault Locator set for a BIPOLAR signal.

3.4 OPERATING PROCEDURE. Margin Test for locating a Marginally Operating Repeater.

a. Having first completed paragraph 3.3, leave patches or repatch from test set to repeatered line and fault locating line as in 3.3a.

b. For each applicable position of the LINE FILTER switch in turn, go through the following steps.

c. With the FUNCTION switch in the MEAS 1 position and the PULSE PERIOD switch at 11 (REF), adjust the LEVEL switch and VERNIER to give a zero reading on the meter.

d. Without changing the VERNIER control, operate the PULSE PERIOD switch to each position in turn and note the corresponding meter reading for each position.

e. For a normally operating line, it is expected that for PULSE PERIOD 10, 9 and/or 8, the meter deflection from the adjusted value established in 3.4c will be less than 0.5 dB. As each repeater is stressed further by lower settings of the PULSE PERIOD switch (e.g. 7,6,5) the meter deflection will usually exceed 0.5 dB at a pulse period which depends on the operating margin of the repeater being tested or of another repeater nearer the office. At position 4 the repeater is stressed to failure and an abrupt drop to between –10 dB and –15 dB will occur in the signal level. A poor repeater may cause more than 0.5 dB meter deflection for pulse periods as high as 8,9, or 10 and will affect the indication of all other repeaters farther away from the office.

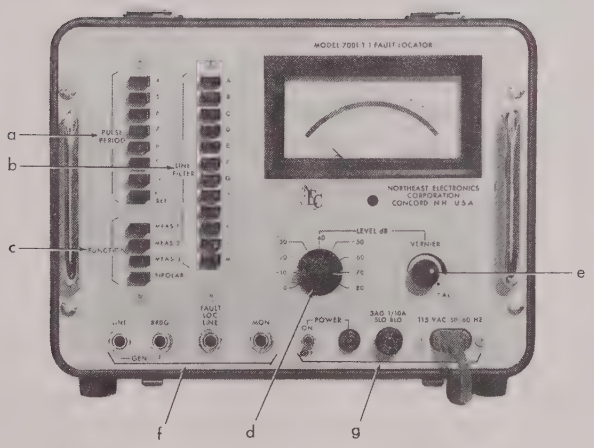


Figure 3–1. Model 7001 Front Panel Controls, Indicators and Connectors

CIRCUIT DESCRIPTION

4.1 GENERAL DESCRIPTION: The major functions performed by the T1 Fault Locator are indicated in the block diagram of figure 4–1.

4.2 The CLOCK is basically a crystal-controlled oscillator of 1.544 megahertz (MHz) nominal frequency and a squaring circuit which produces a 5 Volt positive 50% duty cycle.

4.3 The COUNTER with its four stages produces pulses of 2,4,8 and 16 times the pulse width of the clock pulses at correspondingly reduced pulse rates.

4.4 Combinations of the COUNTER output signals are controlled by the PULSE CONTROL circuits. The combinations are selected by manually operated pushbutton switches to determine the repetition rate of the final signal.

4.5 The FUNCTION GENERATOR circuits generate the component pulses required to produce the four types of signals to be repeated in each pulse period. Combinations of these component pulses are selected by manually operated pushbutton switches and fed into the MODULATOR for further processing.

4.6 The MODULATOR is also fed by voice frequency pulses from the VF OSCILLATOR. The oscillator frequency is controlled by manually operated pushbutton switches in the VF SELECTOR so that the modulation frequency of the line signal corresponds to one of 12 narrow band frequencies of the interrogation filters along the line.

4.7 The DRIVER circuit converts the train of unipolar pulses, one side grounded, to pulses of alternate polarities in each pulse period in a circuit balanced to ground.

4.8 In the receiving direction, the buffer amplifier, preceeded by the "40 dB step" portion of the

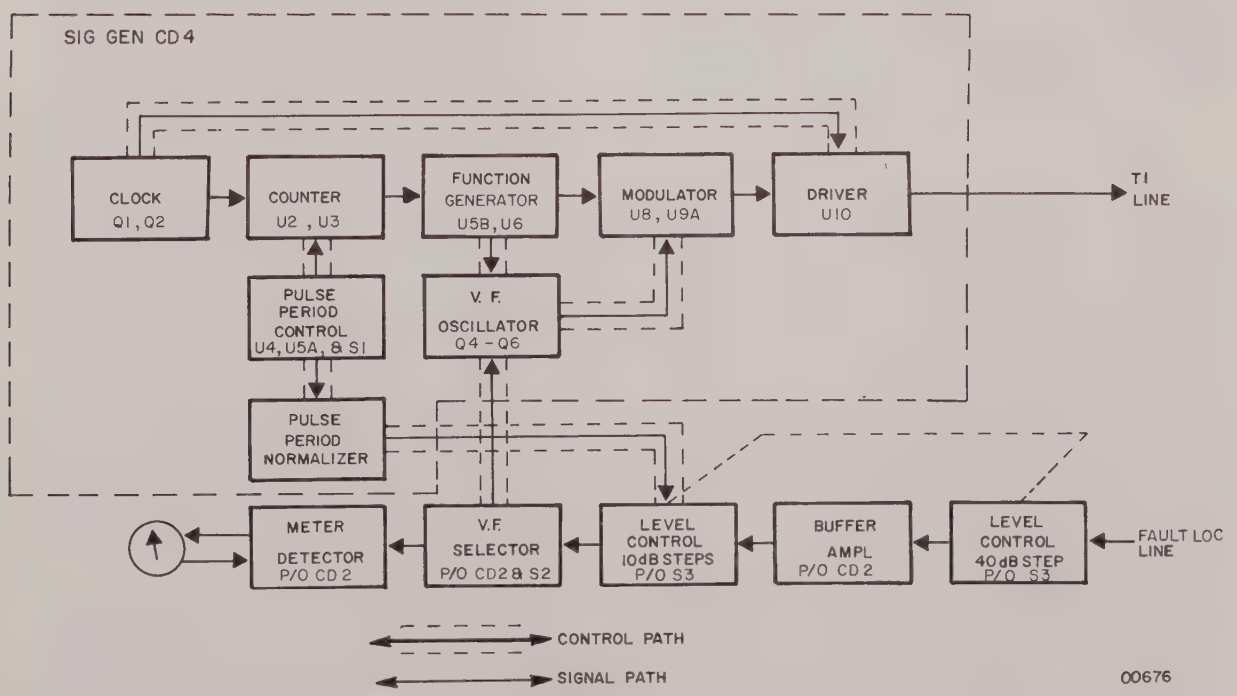


Figure 4–1. Model 7001 Block Diagram

level control and followed by the "10 dB step" portion of the level control, accepts incoming voice frequency signals over a range of 98 dB in amplitude to give an on-scale meter indication. The circuit contains fixed gain, a tuned 60 Hz rejection filter, and adjustable loss.

4.9 The VF SELECTOR not only controls the modulation frequency of the outgoing signal, but also controls the mid-frequency of a narrow band active filter to the same nominal value. This filter further reduces the interfering effect of line noise at frequencies outside of the band pass.

4.10 The PULSE PERIOD NORMALIZER adjusts the sensitivity of the detector to compensate for the variation in signal generator line power resulting from variation of the pulse period, thus automatically recalibrating the detector for each pulse period.

4.11 The METER DETECTOR circuit converts the incoming filtered signal to direct current which operates the meter.

4.12 The basic pulse patterns which can be sent out on the T1 line by the signal generator are shown in figure 4–3. In all four of these patterns the pulse density may be varied by adjusting the length of the pulse period from 11 polar positions to 4 pulse positions. In all except the BIPOLAR pattern, which has no VF component, the length of the VF CYCLE may also be varied by adjusting the frequency of the modulating voice signal to correspond to the mid-band frequency of one of the 12 interrogation filters which may be installed on the line.

4.13 SIGNAL GENERATOR (Refer to figure 7–3). The signal generator is a hybrid of medium-power, high-speed, integrated-circuit logic elements and discreet transistor circuits. The logic convention is high true, with logical one (1) corresponding to +5V, logical zero (0) OV. Figure 4–2 illustrates the logical sequence of the signal generator.

a. CLOCK: Transistor Q1 and associated components form a crystal-controlled Colpitts oscillator operating at 1.544 MHz. Transistor Q2 interfaces the oscillator with OR gate U1 which functions as a Schmitt trigger, or squaring circuit, to generate the clock pulse train (CL). Width of the clock pulse is controlled by R7.

b. COUNTER: Integrated circuit U2 functions as a 4-bit ripple binary counter. The four binary outputs (A,B,C and D) and their complements produced by the quad NOR gates of U3 are appropriately decoded to generate the pulse period

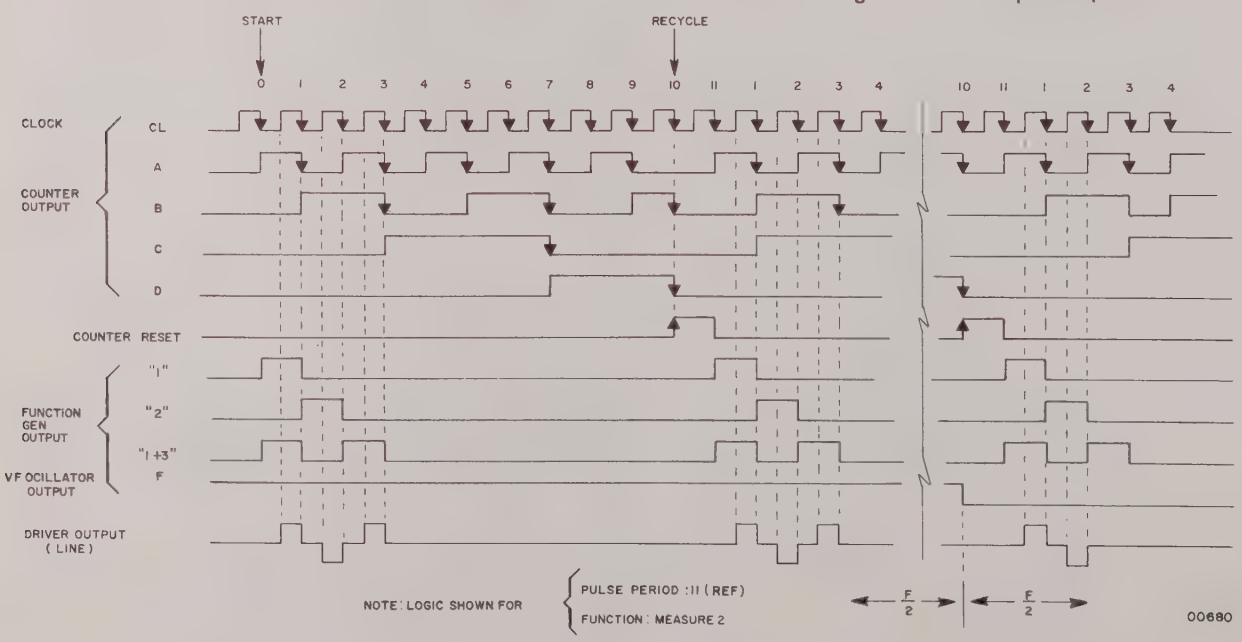


Figure 4–2. Signal Generator Timing Diagram

timing and pulse functions.

c. PULSE PERIOD CONTROL: The NOR gates of U4 and U5A in conjunction with the PULSE PERIOD switch, S1A, combine the counter outputs to produce a reset pulse. This pulse is gated with the clock pulse, forcing the counter to recycle repetitively at a rate corresponding to the selected pulse period.

d. FUNCTION GENERATOR: NOR gate U5B and U6 combine the counter outputs to produce pulses corresponding to component pulse "2", and pulses "1" and "1 + 3", respectively. Combinations of the component pulses are selected by the FUNCTION switch S1B and are subsequently applied to the MODULATOR for further processing.

e. VF OSCILLATOR: Transistors Q4, Q5,Q6,Q7 and associated components form a voltage-controlled bistable multivibrator operating at twice the required voice frequency. The frequency is controlled by a voltage divider on the VF SELECTOR. Frequency calibration is provided by R23. Transistor Q3 serves as interface between the multivibrator and NOR gate U9B, which in turn drives the JK binary element U7. The complimentary outputs of U2 (F and E) are precise square waves having a fundamental frequency equal to the selected voice frequency. $\overline{F}$ and $\overline{E}$ are applied to the MODULATOR in the MEASURE 1,2 and 3 FUNCTION settings. In the Bipolar FUNCTION setting, the JK binary is forced to reset (output F is held at logical zero), thus disabling the VF signal.

f. MODULATOR: The MODULATOR is composed of NOR gates U8 and U9A. Here the function generator and VF OSCILLATOR outputs are gated to produce the positive and negative portions of the output signal: hence, for measure 1,2, and 3 components "1", "2", and "1 + 3" are combined with the VF OSCILLATOR output to produce the desired pattern; for BIPOLAR, only components "1" and "2" are present. See figure 4–3.

g. DRIVER: The MODULATOR outputs at U9A are gated with the clock pulse at U10, which in conjunction with T1 form a push-pull output stage to deliver the final output signal to the LINE jack. Output level adjustment is provided by R24,Q8 and associated components. The output is balanced to chassis through R26.

4.14 BUFFER AMPLIFIER. The buffer amplifier is a single input, single ended integrated circuit amplifier having a restricted bandwidth and an input impedance greater than 90K over the T1 Fault Locating frequencies. The input is ac coupled. The input looks into a biased emitter follower circuit which functions as an impedance converter for an L–C 60 Hz reject filter, the output is ac coupled to a wide band amplifier, having 50 dB of gain. This gain is obtained by the use of feedback resistors R8 and R7. The output is ac coupled to external circuits. See figure 7–5.

4.15 VOICE FREQUENCY SELECTOR. The voice frequency selector is a single input, single ended two pole active Wein bridge filter. The filter consists of two identical amplifiers, each relying on reactive and non-reactive feedback for filter characteristics. The reactive positive feedback provides shaping, the non-reactive negative feedback provides stability. The overall gain is a function of both positive and negative feedback at resonance and is approximately 20 dB. The first stage input is ac coupled; negative feedback is established by the path of R14 in series with R15 gain adjust potentiometer. Positive feedback is established by components both on and off the printed circuit board. The local components are capactive and are fixed in value for all frequencies, while the components not appearing on this board are resistive and are different in value from one frequency to another. These frequency determining resistors are inserted into the circuit by operating the pushbutton LINE SELECTOR switch. See figure 7–5.

4.16 METER DETECTOR. The meter detector is comprised of a wide-band amplifier and a full wave bridge rectifier which develops the dc driving current for the meter. The amplifier is ac coupled and is dc biased midway between supply and common by resistors R22 and R23. The amplifier output is used as a dc bias for transistors Q2 and Q3 which provide current gain for the bridge, and as a signal source to drive the bridge. The output of the bridge is used as negative ac and dc feedback for the amplifier and as dc drive through series resistors R27 and R28. Gain is determined by the series resistor R24, and gain adjust potentiometer R25. See figure 7–5.

4.17 POWER SUPPLIES. The power supply circuits convert line derived ac Power to the 5 and 24 Volt dc levels appearing throughout the instrument. The raw dc for the twenty-four Volt regulator is provided by a full wave bridge and filtered by the capacitor C1. The integrated circuit voltage regulator U1 is powered by the bridge through series limiting resistor R1. The series pass transistor Q1 is powered directly by the bridge and driven by the emitter output of U1. The diodes CR9 through CR12 assure that the supply voltage for U1 never drops below the operating voltage necessary to regulate twenty-four Volts, which appears at the emitter of Q1. Also attached to the emitter of Q1 is a voltage divider circuit which senses variations in output voltage for regulation and serves as a voltage adjustment. The output capacitor C3 is a final filtering stage. See figure 7–4.

4.18 The raw dc for the five Volt regulator circuit is provided by a full wave bridge and filtered by the capacitor C4. The regulator circuit consists of a differential amplifier and current source, the output of which is used to drive a Darlington pair, which serves as the series pass element. The reference for the differential amplifier is provided by a division of the regulated twenty-four Volts, while the feedback is provided by an adjustable voltage division of the regulated five Volts. The output capacitor C5 is a final filtering stage.

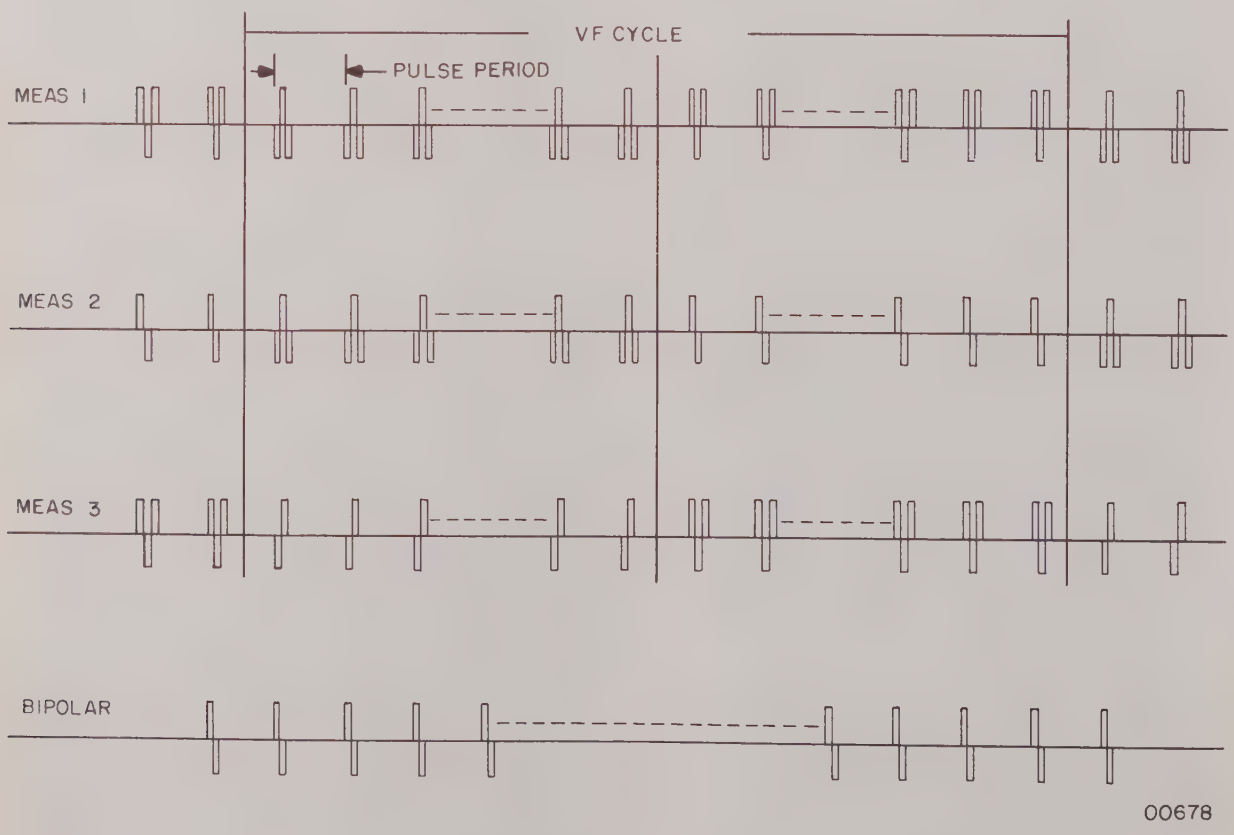


Figure 4–3. Model 7001 Pulse Output Patterns

MAINTENANCE AND CALIBRATION

5.1 INTRODUCTION. Since the operating features of the 7001 are either built into the circuits by component selection or are permanently adjusted in the factory using precision test equipment, it is recommended that no attempt be made to readjust or repair any set suspected of faulty operation. The set should be returned for repair according to the warranty instructions in the front of this manual. Where marginal operation is suspected and the required test equipment is available, the following diagnostic tests may be performed to determine the need for repair.

5.2 OPERATIONAL TEST PROCEDURE.

5.3 REQUIRED EQUIPMENT:

a. Sine wave generator: output frequency adjustable from 750 Hz to 3,500 Hz and output amplitude adjustable to 0.95 Vrms ±2% while driving a 900 ohm load. NEC TTS 4 or equivalent.

b. AC voltmeter: 1% accuracy when measuring the sine wave generator output. Hewlett-Packard 400FL or equivalent.

c. Frequency counter: 0.5% accuracy from 750 Hz to 4 kHz. NEC TTS 80 or equivalent.

d. Oscilloscope: Tektronix M422 or equivalent with X10 probes approximately 3.5 feet long.

e. Precision attenuator: 1% accuracy. Daven VT795G or equivalent.

WARNING

To avoid electrical shock, disconnect 115 Vac power before removing the Model 7001 from its case for repairs. If power is connected to the 7001 while removed from the case, avoid physical contact with electrical components and terminals near the 115 Vac power receptacle.

NOTE

Removal of the Model 7001 from its case is unnecessary for the following tests.

5.4 SENDING TEST.

a. Apply power to the Model 7001 and set front panel controls as follows: LEVEL dB to 0, VERNIER fully cw to CAL, PULSE PERIOD to 11 (REF), FUNCTION to BIPOLAR, and LINE FILTER to A.

b. Terminate the GEN-LINE output jack into a 100 ohm 1% resistor. Set scope controls as follows; Added Mode, Invert Channel 2, Vertical —1.0V/CM and Horizontal — 0.1μsec/cm. Connect scope probes across the 100 ohm terminating resistor and attach both probe ground leads to the Model 7001 chassis ground. The toggle handle of the POWER switch may be used as chassis ground. The scope should show a peak to peak pulse amplitude of 6.0 volts ±10% and a pulse width of 324ns ±10% at the 30% level.

c. Using the scope, measure the pulse period. The pulse period should be as shown in table 5—1 for PULSE PERIOD switch position 11 (REF).

d. In sequence, measure pulse periods for PULSE PERIOD switch positions 10 through 4. Pulse periods should be as shown in table 5—1 for each switch position.

e. Set FUNCTION switch to MEAS 1 position.

f. Set scope to trigger internally and to measure 0.2 V/cm vertically and 1.0ms/cm horizontally. Center the modulation trace on the scope, noting that the square wave passes through zero.

g. Set FUNCTION switch to MEAS 2. Half the square wave noted in step f. should appear on the scope.

h. Set FUNCTION switch to MEAS 3. Half the square wave noted in step f. should appear on the scope, but this half should be the opposite of the half observed in step g.

scope probes.

i. In sequence, select LINE FILTER switch positions A through M and note that the modulation frequency increases with each position.

j. Disconnect the scope and the 100 ohm termination.

NOTE

Polarity of the square wave halves in steps g. and h. are not significant, since polarity depends on connections of the scope probes.

Table 5—1. Pulse Period Per Pushbutton Selection

Pulse Period Sw Posn	Period (μs ±10%)	Pulse Period Sw Posn	Period (μs ±10%)
11 (REF)	7.1	7	4.5
10	6.5	6	3.8
9	5.8	5	3.2
8	5.1	4	2.6

5.5 RECEIVING TEST.

a. Set front panel controls as specified in paragraph 5.4 step a.

b. Connect the sine wave generator to the FAULT LOC LINE jack. Monitor the sine wave generator output with the frequency counter and the ac voltmeter.

c. With sine wave generator output amplitude set at 0.95 Vrms (0 dBm), adjust the frequency to peak the meter on the Model 7001. The meter should peak near 0 dB at a frequency within the limits shown in table 5—2 for the applicable LINE FILTER switch position.

d. In sequence, select LINE FILTER switch positions B through M and repeat step c.

5.6 ATTENUATOR TRACKING TEST.

a. Connect the precision attenuator in series between the sine wave generator and the FAULT LOC LINE jack.

b. Set the precision attenuator to 0 dB.

c. Set front panel controls as specified in paragraph 5.4 step a.

d. Adjust sine wave generator frequency to peak the Model 7001 meter. Peak will occur at approximately 832 Hz.

e. Adjust sine wave generator level to set the 7001 meter at 0 dB.

f. Reduce the attenuation by 10 dB on both the precision attenuator and the Model 7001, using the LEVEL dB switch for the latter. The Model 7001 meter should indicate between −0.5 dB and +2.0 dB.

g. Repeat step f for all positions of the LEVEL dB switch.

h. Set precision attenuator and LEVEL dB switch to 0 dB.

i. Turn VERNIER control fully ccw and observe meter indication of approximately −10 dB.

j. Set VERNIER control to CAL position (fully cw).

k. In sequence, depress PULSE PERIOD switches 10 to 4 and observe that the meter indicates more attenuation at each successively lower PULSE PERIOD selection. Total attenuation at PULSE PERIOD 4 should be approximately −8.8 dB.

l. Proceed to next test.

5.7 MONITOR TEST.

a. With controls and test connections left as set up for the attenuator tracking test, connect a low impedance earphone to the MON jack.

b. Set PULSE PERIOD switch to 11 (REF) and observe that the meter indicates 0 dB. The output signal of the sine wave generator should be audible in the earphone.

Table 5–2. Line Filter Frequencies

Line Filter SW Posn	Frequencies in Hz		
	MIN	NOM	MAX
A	816	832	848
B	910	928	946
C	1027	1048	1069
D	1182	1206	1230
E	1313	1340	1367
F	1478	1508	1538
G	1688	1722	1756
H	1968	2008	2048
J	2149	2193	2237
K	2390	2413	2486
L	2627	2680	2733
M	2956	3017	3076

ELECTRONIC PARTS LIST

6.1 INTRODUCTION.

6.2 This section contains a complete listing of electronic parts for the Model 7001. Table 6–1 is a list of Federal Supply Code of Manufacturers (FSCM) for replaceable parts. Parts list tables 6–2 through 6–11 are arranged alpha-numerically by reference designation. Component location diagrams, figures 6–1 through 6–8, are provided to facilitate manitenance.

Table 6–1. List of Manufacturers

Code	Manufacturer
00124	Veeco Instruments Inc., Plainview, L.I., N.Y. 11803
01121	Allen Bradley, Milwaukee, Wis. 53212
01295	Texas Instruments Inc., Dallas, Texas 75222
04713	Motorola Inc., Pheonix, Arz. 85008
05397	Raco Div., Circle Seal Corp., Anaheim, Ca. 92803
05844	Callins Industries Inc., Greenfield, Tenn. 38230
06486	IRC Div. of TRW , Lynn, Ma. 01905
06555	Beede Electrical Instruments, Penacook, N.H. 03301
09353	C & K Components Inc., Watertown, Ma. 02172
12065	Transitron Electric Corp., Boston, Ma. 02128
13606	Sprague Electric Co., Concord, N.H. 03301
18043	Profile Electronics, Concord, N.H. 03301
18324	Signetics Corp., Sunnyvale, Ca. 94086
19701	Electra/Midlands, Mineral Wells, Texas 76067
22650	Whale Electronics, Nashville, Tenn. 37204
27735	F–DYNE Electric Co., Fairfield, Conn. 06430
49671	RCA Corp., New York, N.Y. 10020
71400	Bussman, St. Louis, Mo. 63017
71450	CTS Corp., Elkhart, Ind. 46514
71590	Centralab Electronics, Milwaukee, Wis.53201
71744	Chicago Miniature Lamp, Chicago, Ill. 60640
72136	Electro Motive Mfg., Willimantic, Conn. 06226
72619	Dialight Corp., Brooklyn, N.Y. 11237
73138	Beckman Instruments, Fullerton, Ca. 92634
76493	Miller J.W. Company, Compton, Ca. 90024
79066	Valpey Corp., Holliston, Ma. 01746
80223	United Transformer Co., New York, N.Y. 10013
81095	Triad Transformer Corp., Venice, Ca. 90293

Table 6–2. Model 7001 Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
F1	.1A 00 250V	71400	MDL	863101600
L1	T-2 1/15W 00 105V	71744	NE2-D	730000700
M1	.5MA 2%	06555	90o888	901300600
R1	4o4- 1/8W 1%	19701	MF5C	220246401
R2	SAME AS R1			
R4	75C# 2W 20%	71590	HMP-750	232207510
S4	DPDT 5A 00 28V	09353	72o1P	620400600
T1	P5O TO 6OO S5OK SPLIT	80223	A-20	400200100
T2	XFMR PWR NEC-1 W/O CASE	PRECISION	NEC 1-U	420200900
XF1	FUSEHOLDER,3AG PANEL	71400	HKP	863000100
XU1		72619	137-8836-0933-552	828002600

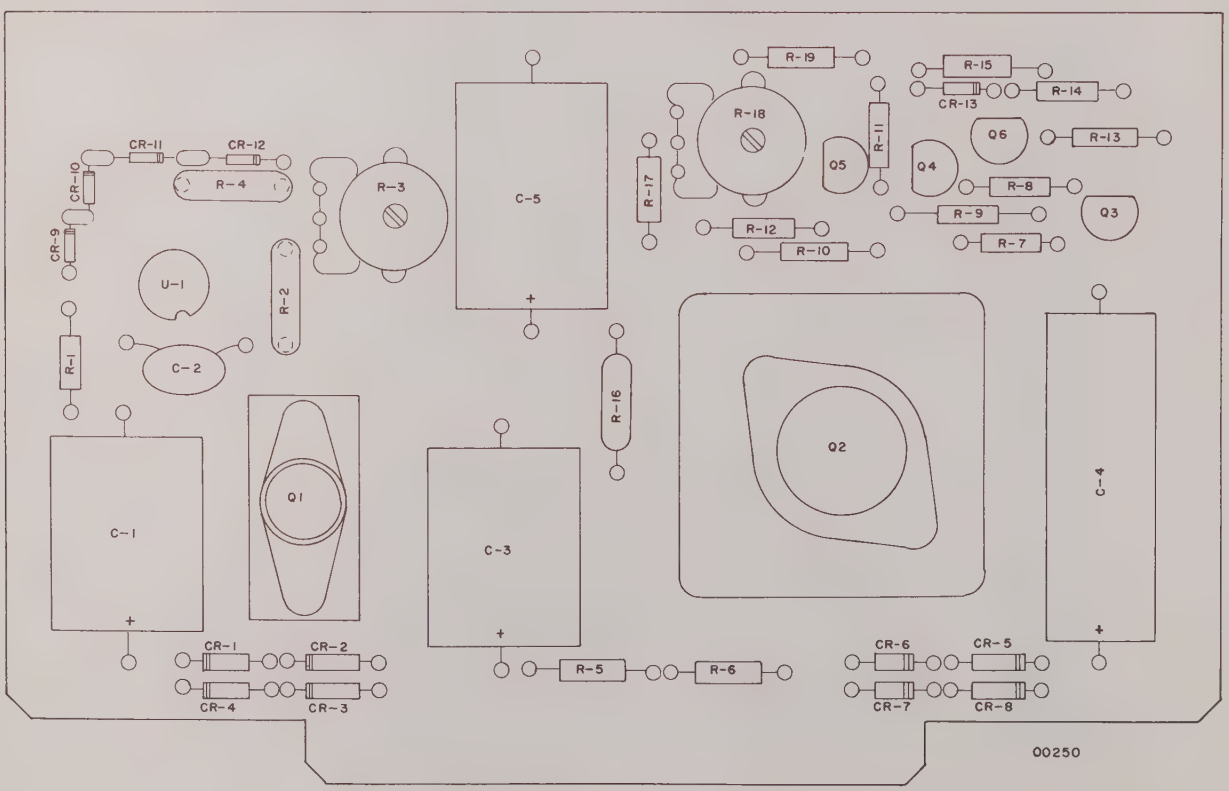


Figure 6–1. Model 7001 Power Supply Card 1, Component Location Diagram

Table 6–3. Model 7001 Power Supply Card 1, Parts List

REFERENCE DESIGNATOR	DESCRIPTION				MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	250UF		00	50V	13606	39D257G050HE4	300002570
C2	510PF		5%	500V	72136	CM15-E511J	335005110
C3	SAME AS C1						
C4	1000UF		00	12V	05844	9-85PSD-1000-12	301401080
C5	500UF		00	25V	13606	39D507G025HE4	300005070
CR1	D041	3		400V	12065	IN4004	560040040
CR2	SAME AS CR1						
CR3	SAME AS CR1						
CR4	SAME AS CR1						
CR5	SAME AS CR1						
CR6	SAME AS CR1						
CR7	SAME AS CR1						
CR8	SAME AS CR1						
CR9	D035	500MW	00	20V	12065	1N4148	560041480
CR10	SAME AS CR9						
CR11	SAME AS CR9						
CR12	SAME AS CR9						
CR13	SAME AS CR9						
Q1	TO66LPA	29W	00	55V	49671	40372	550040372
Q2	TO3LPA	115W	00	60V	49671	2N3055	550030550
Q3	TO92AFA	310MW	00	25V	04713	MPS6515	550065150
Q4	SAME AS Q3						
Q5	SAME AS Q3						
Q6	SAME AS Q3						
R1	1.5K	1/2W	10%		01121	TYPE EB	200201526
R2	6.49K	1/8W	1%		19701	MF5C	220264911
R3	1K	.25W	00		71450	UPE200RE1-SR9320	231301020
R4	2.26K	1/8W	1%		19701	MF5C	220222611
R5	22K	1/2W	10%		01121	TYPE EB	200202236
R6	2.7K	1/2W	5%		01121	TYPE EB	200202725
R7	100-	1/2W	10%		01121	TYPE EB	200201016
R8	SAME AS R7						
R9	1K	1/2W	10%		01121	TYPE EB	200201026
R10	SAME AS R9						
R11	SAME AS R7						
R12	SAME AS R7						
R13.	SAME AS R7						
R14	SAME AS R9						
R15	3.9K	1/2W	5%		01121	TYPE EB	200203925
R16	1-	3W	5%	W	LEONARD	TYPE 3X	210300105
R17	1.8K	1/2W	5%		01121	TYPE EB	200201825
R18	SAME AS R3						
R19	2K	1/2W	5%		01121	TYPE EB	200202025
U1	10PT05		00		17803	U5R7723393	500077230

Table 6–4. Model 7001 Filter Detector Card 2, Parts List

REFERENCE DESIGNATOR	DESCRIPTION				MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.015UF		10%	100V	13606	225P15391WD3	320001530
C2	.22UF		10%	80V	13606	192P2249R3	321102240
C3	SAME AS C2						
C4	2.2UF		00	100V	22650	JA-4-2.2-100-8N	301302250
C5	8.2UF		10%	15V	05397	T330A825K015AS	310008250
C6	510PF	Z5RTC	10%	1KV	71590	DD-511	330005110
C7	22PF	S2LTC	10%	1KV	71590	DD-220	330002200
C8	SAME AS C5						
C9	SAME AS C5						
C10	.1UF	.03UF	10%	100V	13606	225P10491WD3	320001040
C11	SAME AS C5						
C12	.01095UF		.5%	100V	TRW	863UW	321310920
C13	SAME AS C6						
C14	SAME AS C7						
C15	SAME AS C12						
C16	.05UF	.03UF	10%	100V	13606	225P50391WD3	320005030
C17	SAME AS C5						
C18	SAME AS C7						
C19	SAME AS C6						
C20	SAME AS C12						
C21	SAME AS C12						
C22	SAME AS C1						
C23	SAME AS C7						
C24	SAME AS C6						
C25	20UF		00	50V	13606	TE1305	300202061
C26	1UF	Z5U TC	20%	25	13606	5C023105X0250B3	330501050
CR1	DD35	500MW	00	20V	12065	1N4148	560041480
CR2	SAME AS CR1						
L1	250MH	17MA	2%		81095	EA-250	460100300
Q1	T05HNS	1W	00	65V	49671	2N2102	550021020
Q2	T092HSS	310MW	00	40V	04713	2N3903	550039030
Q3	T092MSS	310MW	00	40V	04713	2N3905	552039050
R1	220K	1/4W	10%		01121	TYPE CB	200102246
R2	SAME AS R1						
R3	100K	1/4W	10%		01121	TYPE CB	200101046
R4	180K	1/4W	10%		01121	TYPE CB	200101846
R5	SAME AS R4						
R6	1.5K	1/4W	10%		01121	TYPE CB	200101526
R7	1000-	1/8W	1%		19701	MF5C	220210011
R8	316K	1/8W	1%		19701	MF5C	220231631
R9	301-	1/8W	1%		19701	MF5C	220230101
R10	1K	1/4W	10%		01121	TYPE CB	200101026
R11	SAME AS R10						
R12	SAME AS R3						
R13	4420-	1/8W	1%		19701	MF5C	220244211
R14	7870-	1/8W	1%		19701	MF5C	220278711
R15	1K	.5W	10%		06486	500	232601020
R16	SAME AS R6						
R17	SAME AS R3						

Table 6–4. (Cont)

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R18	SAME AS R13			
R19	SAME AS R14			
R20	SAME AS R15			
R21	SAME AS R6			
R22	SAME AS R1			
R23	SAME AS R1			
R24	100- 1/4W 10%	01121	TYPE CB	200101016
R25	SAME AS R15			
R26	SAME AS R6			
R27	220- 1/2W 10%	01121	TYPE EB	200202216
R28	SAME AS R27			
R29	909- 1/8W 1%	19701	MF5C	220290901
U1	14DILP 00	01295	SN72709N14P	500007090
U2	SAME AS U1			
U3	SAME AS U1			
U4	SAME AS U1			
XU1	14PDIL 00	91506	583527 1	820100300
XU4	SAME AS XU1			

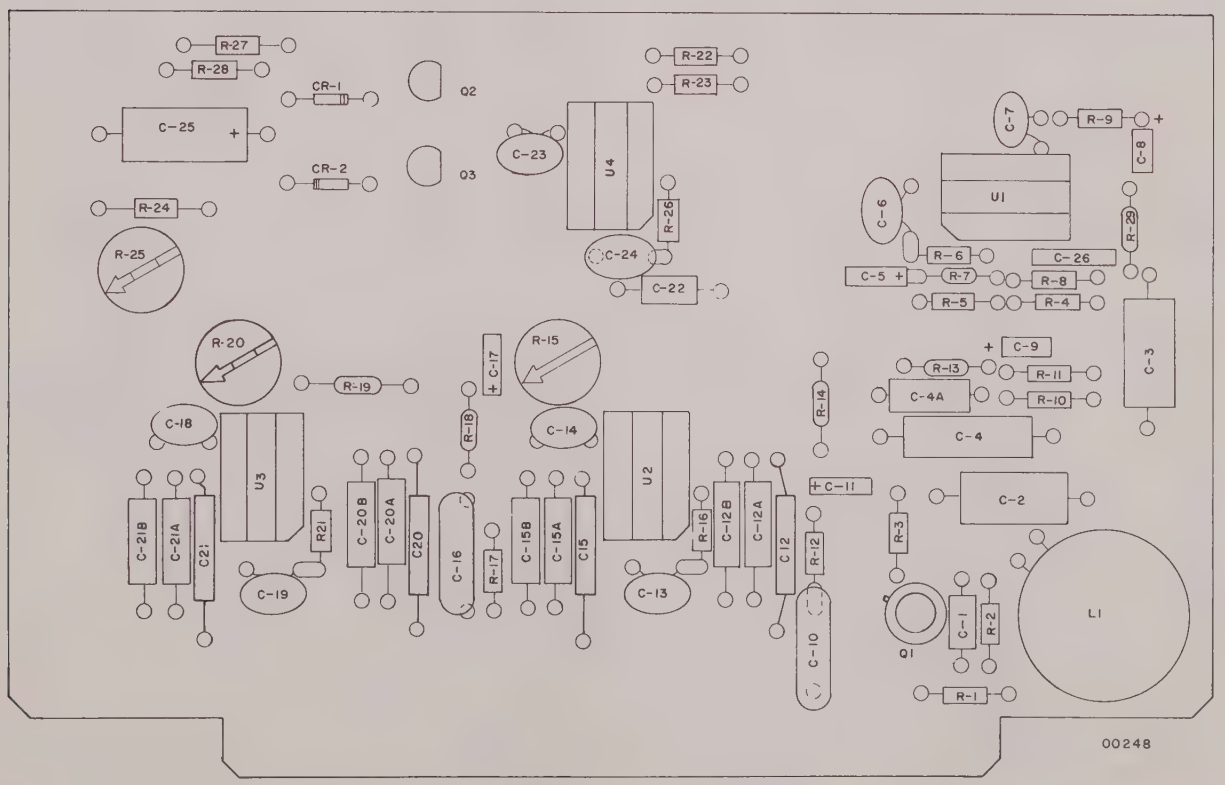


Figure 6–2. Model 7001 Filter Detector Card 2, Component Location Diagram

Table 6–5. Model 7001 Line Filter Selector Card 3, Parts List

REFERENCE DESIGNATOR	DESCRIPTION			MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R1	17.8K	1/8W .25		19701	MF5C	220417828
R2	1.21M	1/4W 1%		19701	MF6C	220512141
R3	15.4K	1/8W .25		19701	MF5C	220415428
R4	715K	1/8W 1%		19701	MF5C	220271531
R5	698K	1/8W 1%		19701	MF5C	220269831
R6	11.8K	1/8W .25		19701	MF5C	220411828
R7	14K	1/8W .25		19701	MF5C	220414028
R8	1.5M	1/4W 1%		19701	MF6C	220515041
R9	11K	1/8W .25		19701	MF5C	220411028
R10	374K	1/8W 1%		19701	MF5C	220237431
R11	9.53K	1/8W .25		19701	MF5C	220495318
R12	9.76K	1/8W .25		19701	MF5C	220497618
R13	7.32K	1/8W .25		19701	MF5C	220473218
R14	1.07M	1/4W 1%		19701	MF6C	220510741
R15	590K	1/8W 1%		19701	MF5C	220259031
R16	8.45K	1/8W .25		19701	MF5C	220484518
R17	6.81K	1/8W .25		19701	MF5C	220468118
R18	6.65K	1/8W .25		19701	MF5C	220466518
R19	6.04K	1/8W .25		19701	MF5C	220460418
R20	6.19K	1/8W .25		19701	MF5C	220461918
R21	4.87K	1/8W .25		19701	MF5C	220448718
R22	976K	1/8W 1%		19701	MF5C	220297631
R23	5.49K	1/8W .25		19701	MF5C	220454918
R24	750K	1/8W 1%		19701	MF5C	220275031
R25	16.9K	1/8W 1%		19701	MF5C	220216921
R26	500-	.75W 10	%	73138	89PR500	232505010
R27	13.4K	1/8W 1%		19701	MF5C	220215421
R28	SAME AS R26					
R29	13.7K	1/8W 1%		19701	MF5C	220213721
R30	SAME AS R26					
R31	1K	.75W 10	%	73138	89PR1K 11.8	232501020
R32	11.3K	1/8W 1%		19701	MF5C	220211321
R33	10.5K	1/8W 1%		19701	MF5C	220210521
R34	SAME AS R33					
R35	9530-	1/8W 1%		19701	MF5C	220295311
R36	9.31K	1/8W 1%		19701	MF5C	220293111
R37	8250-	1/8W 1%		19701	MF5C	220282511
R38	8.06K	1/8W 1%		19701	MF5C	220280611
R39	7150-	1/8W 1%		19701	MF5C	220271511
R40	6810-	1/8W 1%		19701	MF5C	220268111
R41	6.49K	1/8W 1%		19701	MF5C	220264911
R42	SAME AS R26					
R43	SAME AS R31					
R44	5.62K	1/8W 1%		19701	MF5C	220256211
R45	SAME AS R26					
R46	200-	.75W 10	%	73138	89PR200	232502010
R47	SAME AS R26					
R48	4640-	1/8W 1%		19701	MF5C	220246411

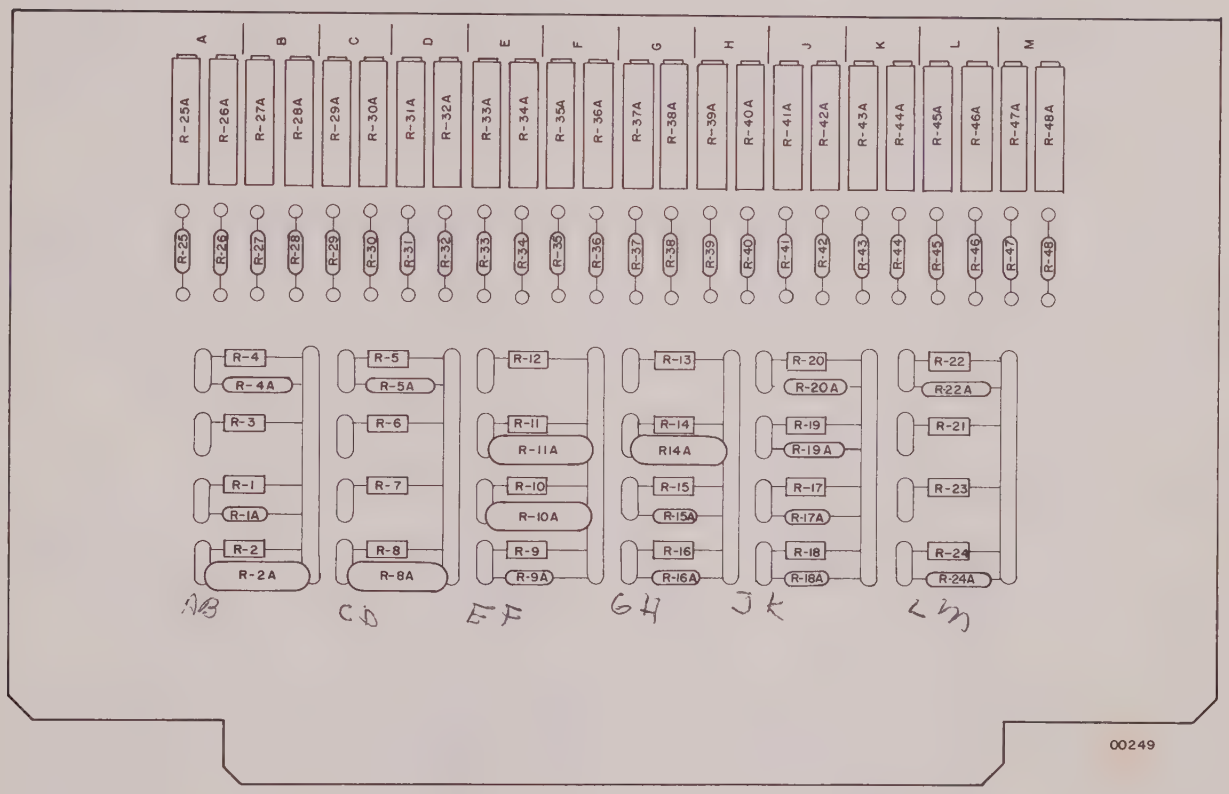


Figure 6–3. Model 7001 Line Filter Selector Card 3, Component Location Diagram

Table 6–6. Model 7001 Signal Generator Card 4, Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	68PF 5% 500V	72136	CM15-E680J	335006800
C2	1UF 10% 35V	05397	T330A105K035AS	310001051
C3	SAME AS C1			
C4	.1UF 80 -20% 75V	71590	DDA-104	330201040
C5	.01UF 5% 100V	27735	PS11-.01-100-5	321501030
C6	2.2UF 10% 35V	05397	T330A225K035AS	310002250
C7	SAME AS C5			
C9	SAME AS C2			
C10	SAME AS C4			
C11	SAME AS C4			
C12	22UF 10% 6V	05397	T330A226K006AS	310002260
C14	15UF 10% 10V	05397	T330A156K010AS	310001560
C15	.47UF Y5V TC 20% 50V	72982	8131-050-651-474M	330804740
CR1	D035 500MW 80 -20% 20V	12065	1N4148	560041480
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
CR5	SAME AS CR1			
Q1	TO92AFA 310MW 80 -20% 25V	04713	MPS6515	550065150
Q2	SAME AS Q1			
Q3	SAME AS Q1			
Q4	TO92HSS 310MW 80 -20% 40V	04713	2N3903	550039030
Q5	TO92MSS 310MW 80 -20% 40V	04713	2N3905	552039050
Q6	SAME AS Q5			
Q7	SAME AS Q4			
Q8	SAME AS Q1			
R1	3.3K 1/4W 10%	01121	TYPE CB	200103326
R2	33K 1/4W 10%	01121	TYPE CB	200103336
R3	390- 1/4W 10%	01121	TYPE CB	200103916
R4	1.5K 1/4W 10%	01121	TYPE CB	200101526
R5	470- 1/4W 10%	01121	TYPE CB	200104716
R6	2.2K 1/4W 10%	01121	TYPE CB	200102226
R7	1K .75W 10 %	73138	89PR1K	232501020
R8	1K 1/4W 10%	01121	TYPE CB	200101026
R9	18K 1/4W 10%	01121	TYPE CB	200101836
R10	SAME AS R8			
R11	47K 1/4W 10%	01121	TYPE CB	200104736
R12	SAME AS R11			
R13	100K 1/4W 10%	01121	TYPE CB	200101046
R14	2K 1/8W 1%	19701	MF5C	220220011
R15	13K 1/8W 1%	19701	MF5C	220213021
R16	SAME AS R15			
R17	SAME AS R15			
R18	SAME AS R14			
R20	10K 1/8W 1%	19701	MF5C	220210021
R21	SAME AS R14			
R22	SAME AS R9			
R23	SAME AS R7			
R24	SAME AS R7			
R25	SAME AS R5			

Table 6–6. (Cont)

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R26	100- 1/4W 10%	01121	TYPE CB	200101016
R27	47- 1/4W 10%	01121	TYPE CB	200104706
R28	SAME AS R27			
R29	SAME AS R8			
RT1	31.5K 00	00124	43R-1	290131520
T1	LOC2MH 00	18043	4401-01-2818	440100100
TP1	PC	EMC	4879-125-9	652900200
TP5	SAME AS TP1			
U1	14DILP 00	18324	SP333A	510003300
U2	14DILP 00	01295	SN7493N	510074930
U3	14DILP 00	18324	SP380A	510003800
U4	14DILP 00	18324	SP370A	510003700
U5	14DILP 00	18324	SP317A	510003170
U6	SAME AS U5			
U7	14DILP 00	18324	SP321A	510003210
U8	SAME AS U3			
U9	SAME AS U3			
U10	14DILP 00	01295	SN7401N	510074010
XY1	TWIN PIN HORIZ.MTG	91506	8000-DG3	826500100
Y1	CRYSTAL SKT MTG	79066	VR6-1.544MHZ	919100500

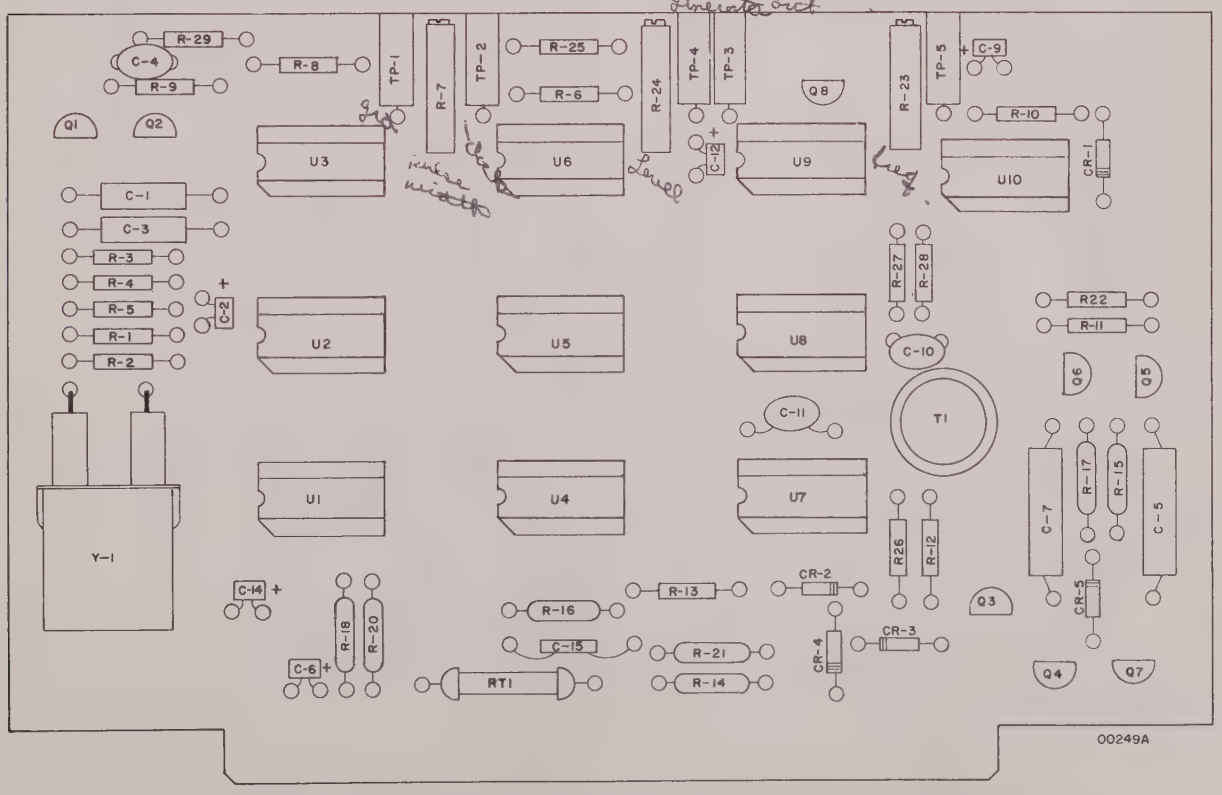


Figure 6–4. Model 7001 Signal Generator Card 4, Component Location Diagram

Table 6–7. Model 7001 Signal Generator Switch and Bd Assy, Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	TEK PART NO.
R29	127- 1/8W 1%	19701	MF5C	220212701
R30	187- 1/8W 1%	19701	MF5C	220218701
R31	267- 1/8W 1%	19701	MF5C	220226701
R32	392- 1/8W 1%	19701	MF5C	220239201
R33	604- 1/8W 1%	19701	MF5C	220260401
R34	1000- 1/8W 1%	19701	MF5C	220210011
R35	2.26K 1/8W 1%	19701	MF5C	220222611

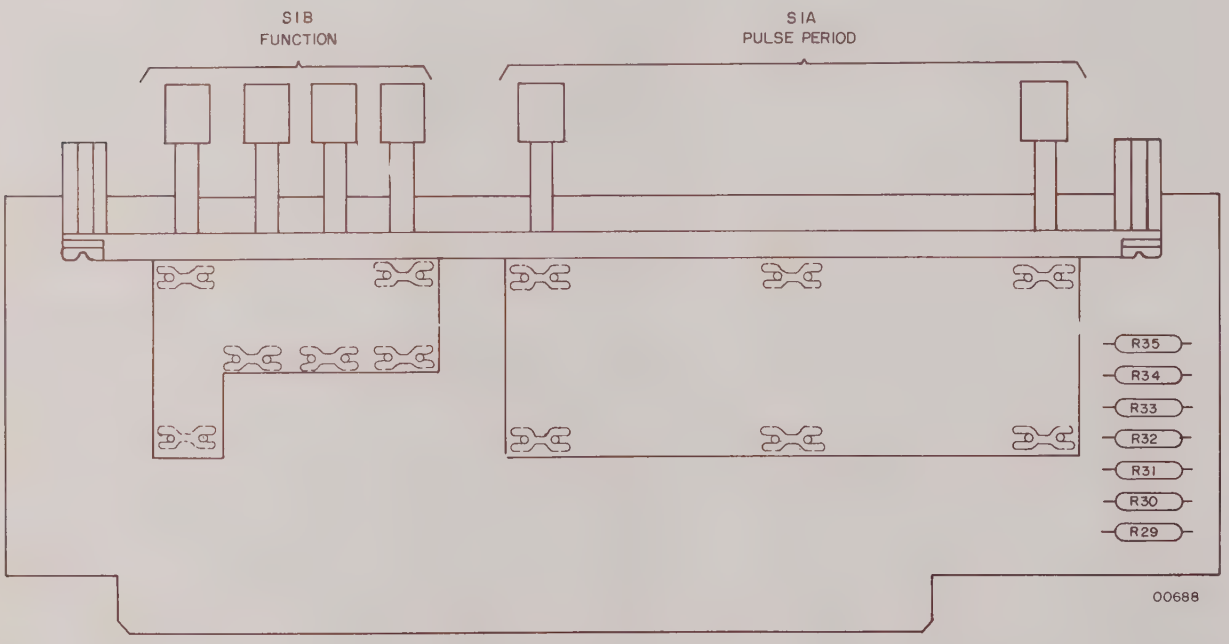


Figure 6–5. Model 7001 Signal Generator Switch S1 & Bd Assy,Component Location Diagram

Table 6–8. Model 7001 Interconnection Board Assy, Parts List

REFERENCE DESIGNATOR	DESCRIPTION			MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	100UF	CO	50V	22650	JA10100508N	301301070
C2	SAME AS C1					
R1	3.9K	1/2W	5%	01121	TYPE EB	200203925

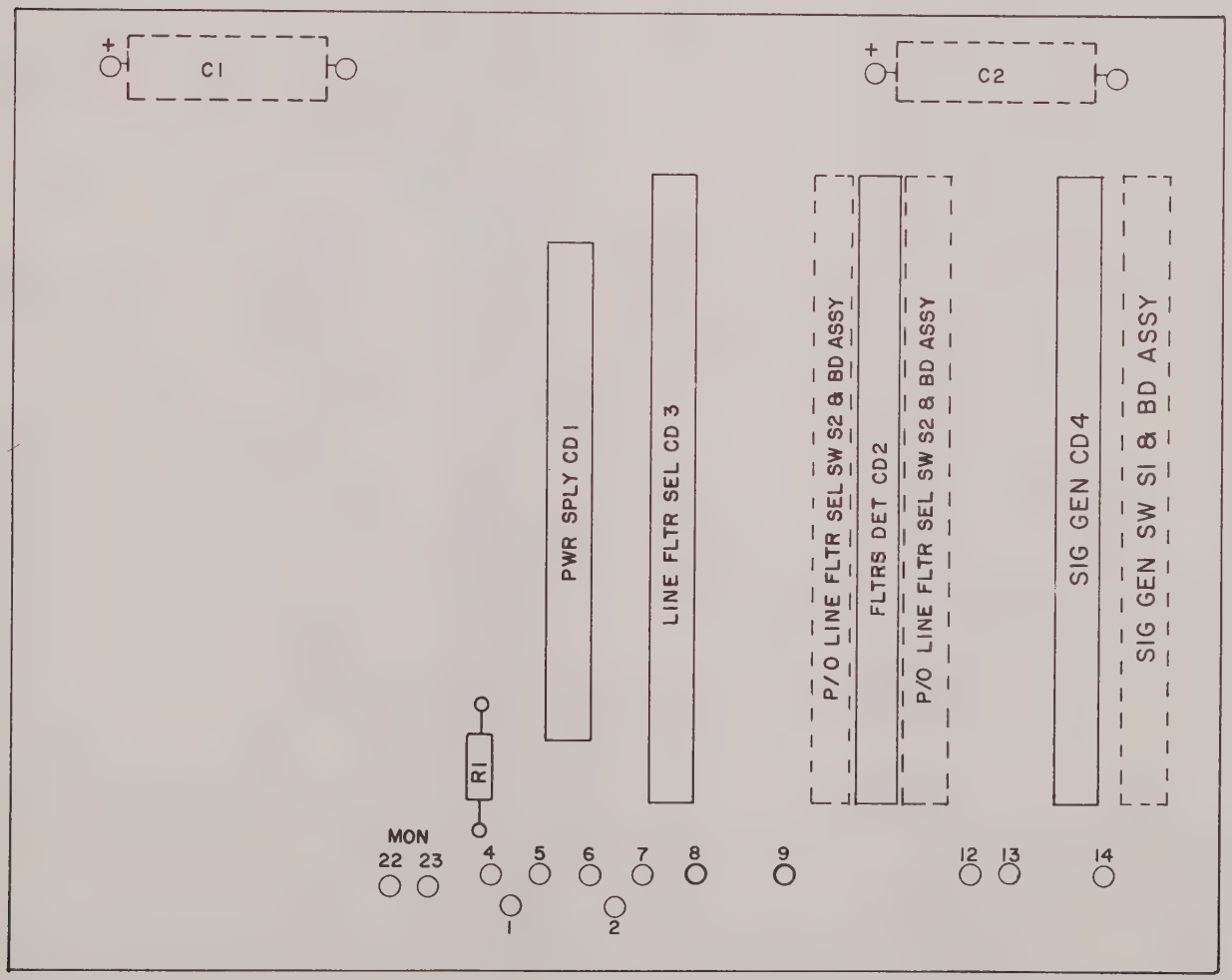


Figure 6–6. Model 7001 Interconnection Board Assy, Component Location Diagram

Table 6–9. Model 7001 Line Filter Selector Switch S2& Bd Assy, Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R1	44.2K 1/8w 1%	19701	MF5C	220244221
R2	37.4K 1/8w 1%	19701	MF5C	220237421
R3	31.6K 1/8w 1%	19701	MF5C	220231621
R4	909K 1/8w 1%	19701	MF5C	220290931
R5	21.5K 1/8w 1%	19701	MF5C	220221521
R6	17.8K 1/8w 1%	19701	MF5C	220217821
R7	14.3K 1/8w 1%	19701	MF5C	220214321
R8	10.5K 1/8w 1%	19701	MF5C	220210521
R9	8660- 1/8W 1%	19701	MF5C	220286611
R10	6980- 1/8W 1%	19701	MF5C	220269811
R11	5230- 1/8w 1%	19701	MF5C	220252311
R12	3480- 1/8w 1%	19701	MF5C	220234811

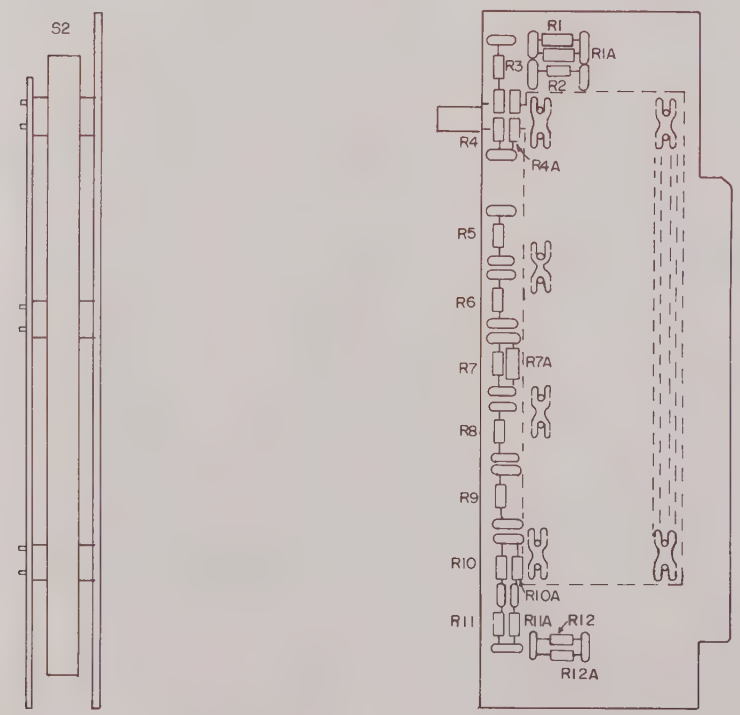
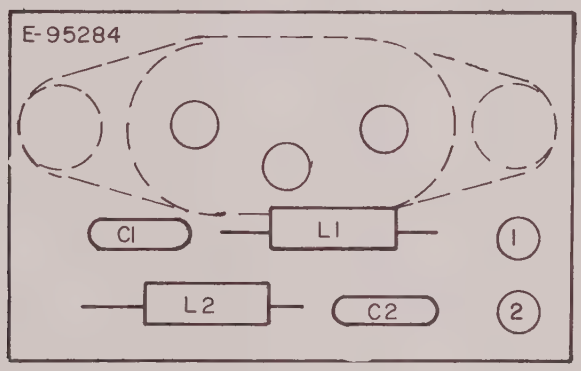


Figure 6–7. Model 7001 Line Filter Selector Switch S2 & Bd Assy, Component Location Diagram

Table 6–10. Model 7001 Line Noise Filter Board Assy, Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1201	470PF Z5FTC 10% 1KV	71590	DD-471	330004710
C1202	SAME AS C1201			
J14	3-PIN MALE RECEPT-GND	82389	AC3G	6?2300100
L1201	100UH 00	76493	9350-08	4?0300?00
L1202	SAME AS L1201			



00687

Figure 6–8. Model 7001 Line Noise Filter Board Assy, Component Location Diagram

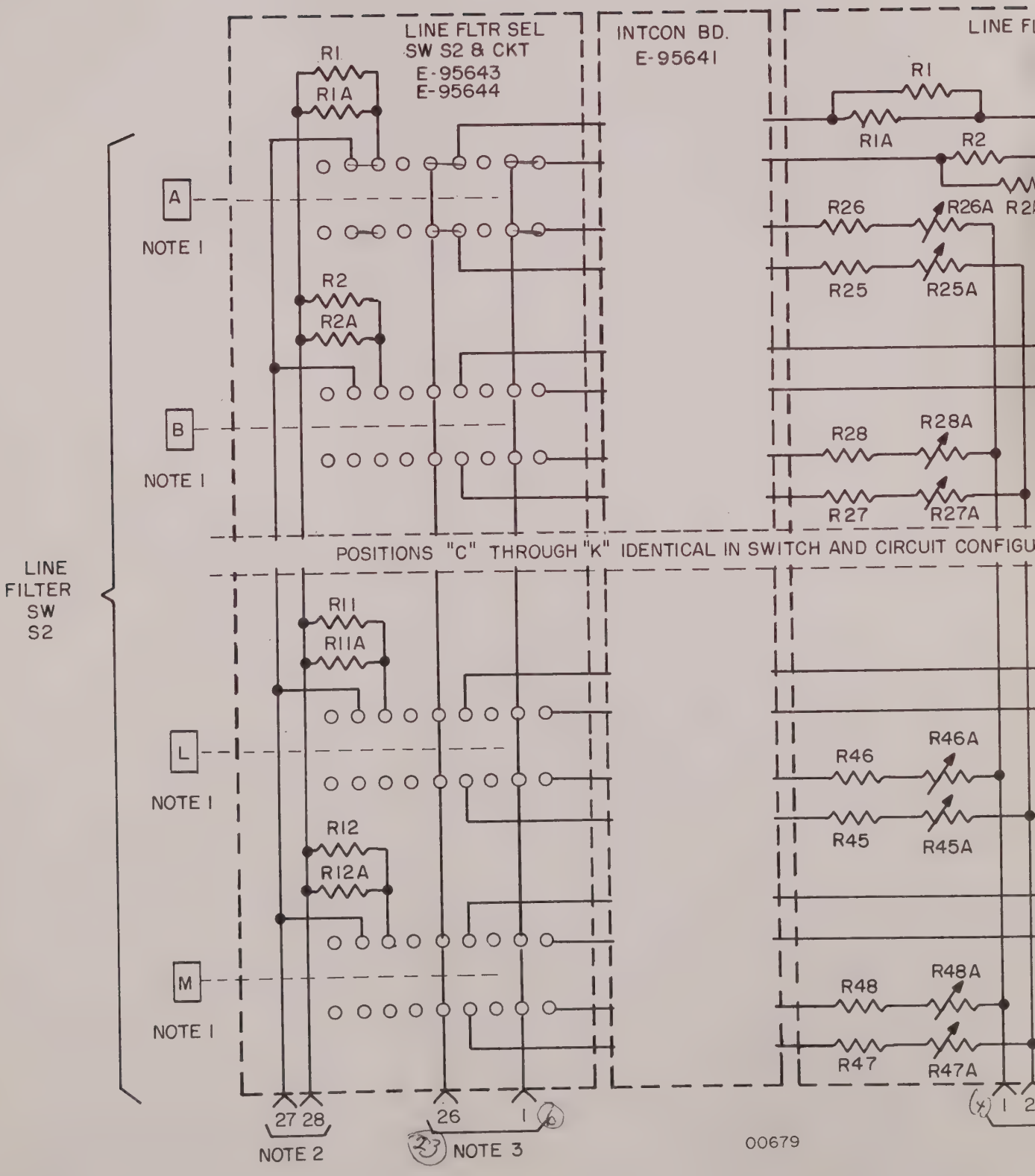
Table 6–11. Level dB Attenuator Switch S3 Assy Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R1	887-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220288701
R2	18.2-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220218291
R3	887-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220288701
R4	150-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220215001
R5	619-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220261901
R6	196-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220219601
R6	23.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220223721
R7	61.9-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220261991
R8	19.6-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220219691
R8	2370-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220223711
R9	10-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210091

SCHEMATIC DIAGRAMS

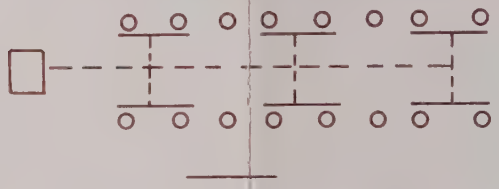
7.1 INTRODUCTION.

7.2 This section provides the schematic diagrams, figures 7–1 through 7–5, for the Model 7001 T1 Fault Locator.


LINE FLTR SEL
SW S2 & CKT
E-95643
E-95644
INTCON BD.
E-95641
LINE FI
R1
R1A
R2
R2A
R26
R26A
R25
R25A
R28
R28A
R27
R27A
R11
R11A
R46
R46A
R45
R45A
R12
R12A
R48
R48A
R47
R47A
A
B
L
M
NOTE 1
LINE
FILTER
SW
S2
POSITIONS "C" THROUGH "K" IDENTICAL IN SWITCH AND CIRCUIT CONFIGU
27 28
NOTE 2
26
1
NOTE 3
00679

NOTES:

1. EACH SECTION OF 12 SECTION LINE FILTER PUSH BUTTON S2 CONSISTS OF SIX C CONTACTS THAT ARE OPERATED SIMULTANEOUSLY BY MECHANICAL COUPLING AS ILLUSTRATED BELOW. THE 12 SECTIONS ARE INTERLOCKED SO THAT ONLY ONE SECTION CAN BE ENGAGED AT ANY TIME.

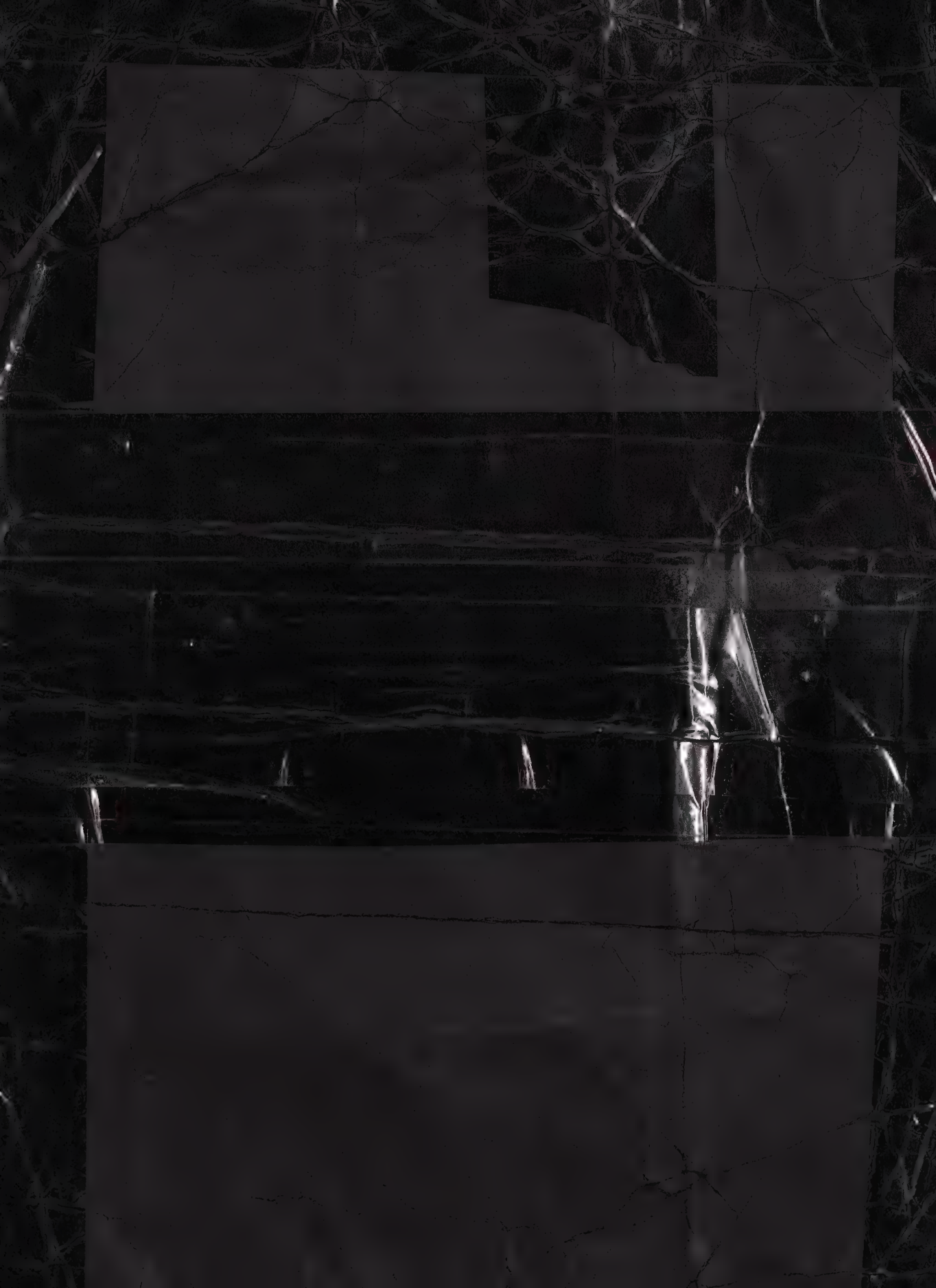


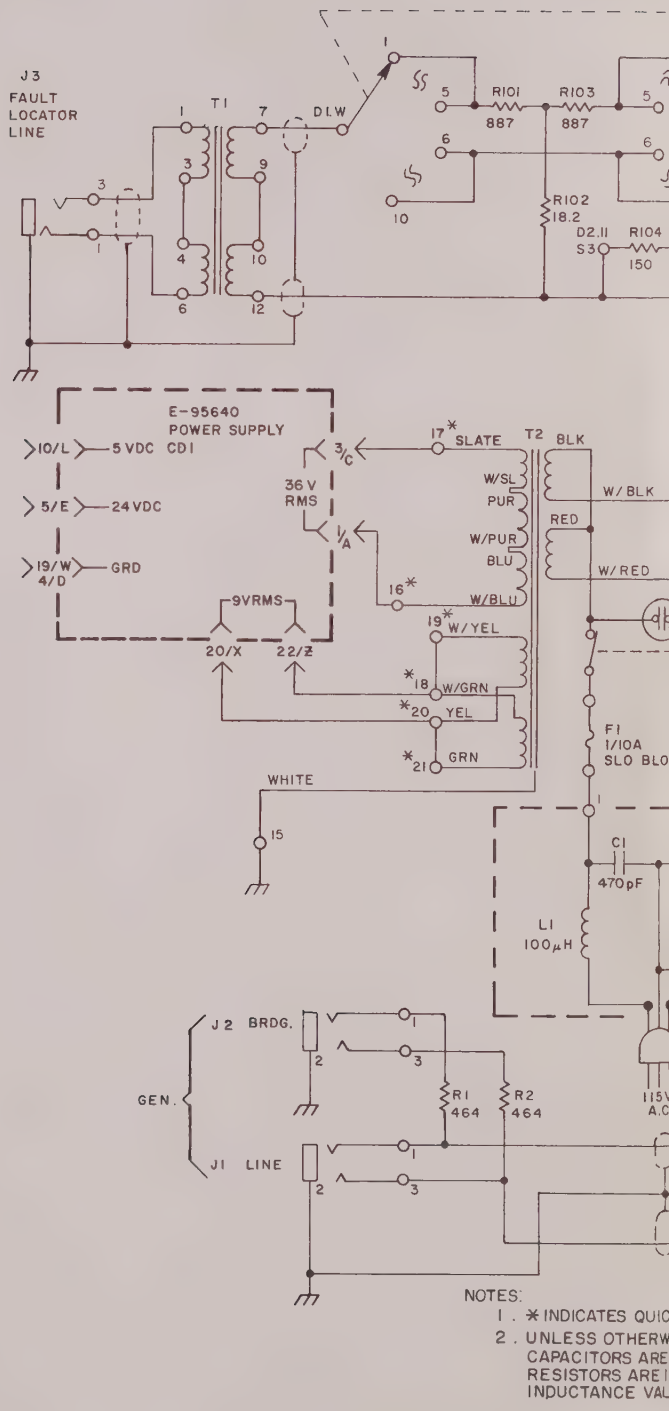
2. PINS $\overline{27}$ & $\overline{28}$ ARE CONNECTED VIA INTERCONNECTION BD. TO PINS $\overline{B}$ & $\overline{C}$ RESPECTIVELY ON SIGNAL GENERATOR CARD 4 TO DETERMINE THE FREQ. OF THE AUDIO MODULATOR.

3. PINS 26 & 1 ARE CONNECTED VIA INTERCONNECTION BD. TO PINS 23 & 6 RESPECTIVELY ON FILTER DETECTOR CARD 2 TO DETERMINE FREQ. OF RECEIVE FILTERS.

4. PINS 1, 28, & A ARE CONNECTED VIA INTERCONNECTION BD TO PINS 4, 14 & 21 RESPECTIVELY ON FILTER DETECTOR CARD 2 TO DETERMINE FREQ. OF RECEIVE FILTERS.

Figure 7–1. Model 7001 Line Filter Selection Circuit, Schematic Diagram




J3
FAULT
LOCATOR
LINE
T1
D1.W
R101
887
R103
887
R102
18.2
D2.11
S3
R104
150
E-95640
POWER SUPPLY
10/L
5 VDC CD1
5/E
24 VDC
19/W
4/D
GRD
36 V
RMS
9VRMS
20/X
22/Z
17*
SLATE
T2
BLK
W/SL
PUR
W/BLK
W/PUR
BLU
RED
W/RED
16*
W/BLU
19*
W/YEL
18*
W/GRN
20*
YEL
21*
GRN
WHITE
15
F1
1/10A
SLO BLO
C1
470pF
L1
100μH
J2 BRDG.
GEN.
J1 LINE
R1
464
R2
464
NOTES:
1. * INDICATES QUIC
2. UNLESS OTHERW
CAPACITORS ARE
RESISTORS ARE
INDUCTANCE VAL

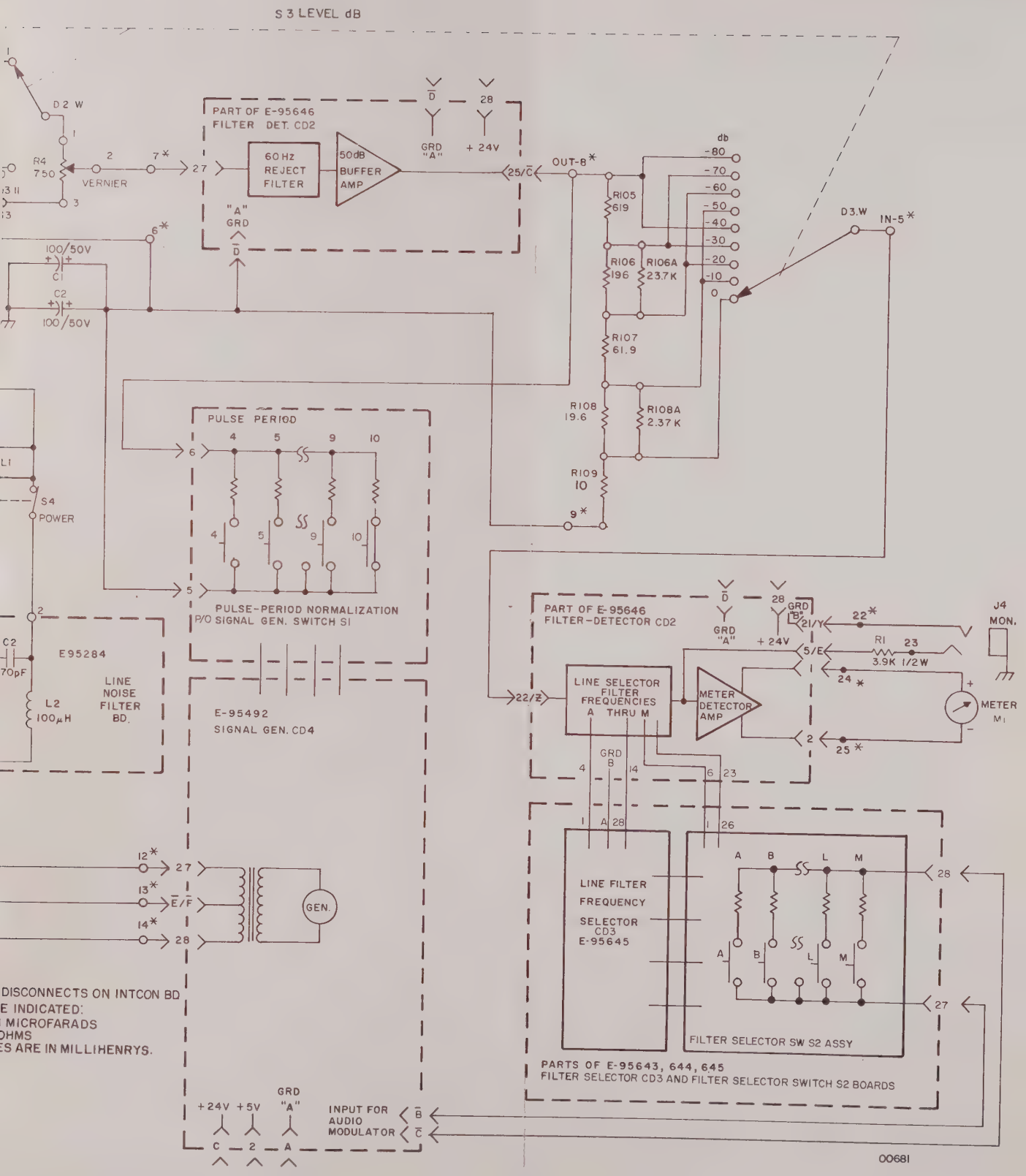
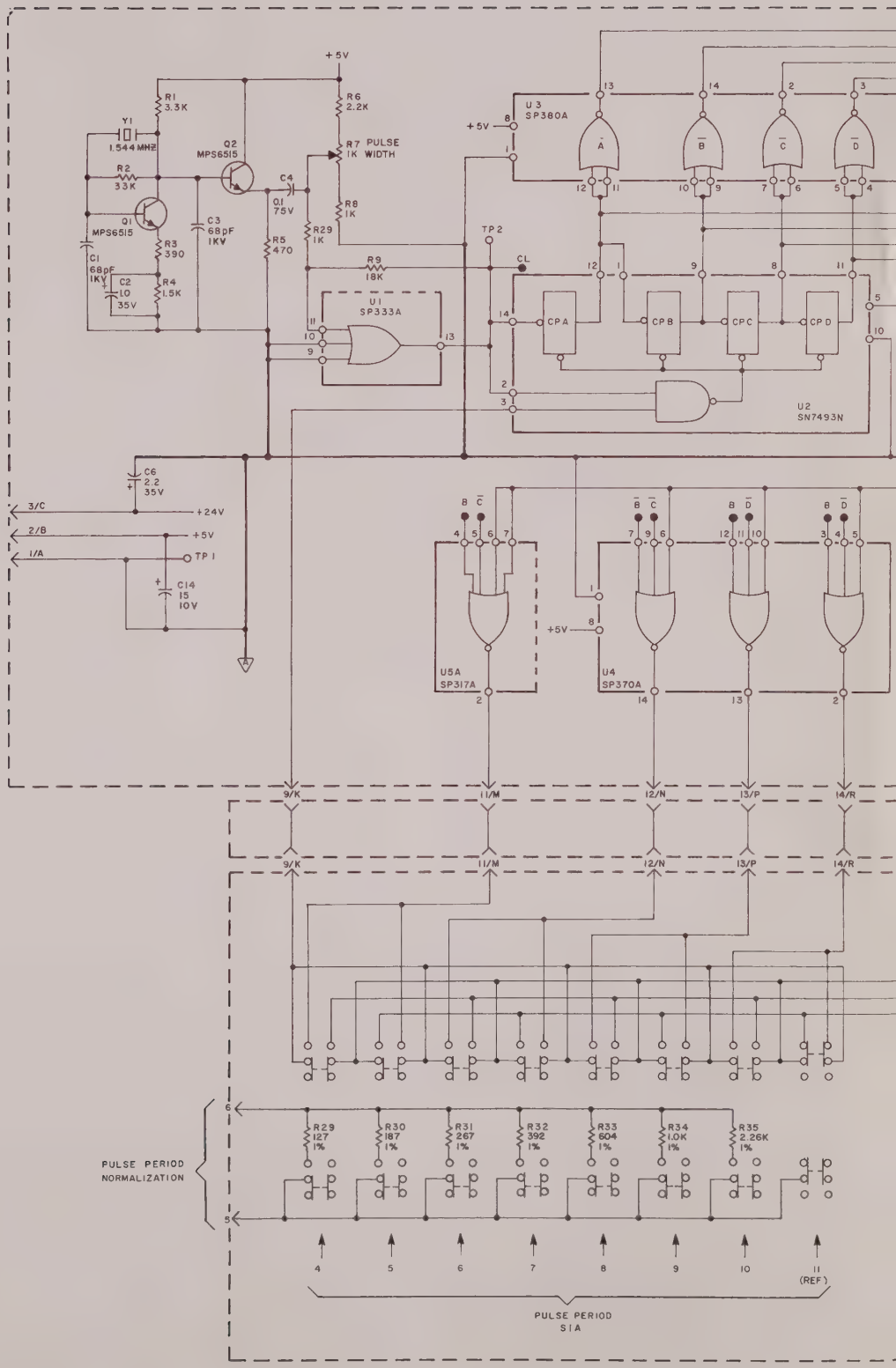


Figure 7–2. Model 7001 Overall Interconnection Schematic Diagram


+5V
R1 3.3K
Y1 1.544 MHz
R2 33K
Q1 MPS6515
C1 68pF 1KV
C2 10 35V
R3 390
R4 1.5K
C3 68pF 1KV
Q2 MPS6515
C4 .01 75V
R5 470
R6 2.2K
R7 PULSE 1K WIDTH
R8 1K
R29 1K
R9 18K
U1 SP333A
TP2
CL
U3 SP380A
CP A
CP B
CP C
CP D
U2 SN7493N
C6 2.2 35V
3/C
+24V
2/B
+5V
1/A
TP1
C14 15 10V
U5A SP317A
U4 SP370A
9/K
11/M
12/N
13/P
14/R
R29 127 1%
R30 187 1%
R31 267 1%
R32 392 1%
R33 604 1%
R34 1.0K 1%
R35 2.26K 1%
PULSE PERIOD NORMALIZATION
4
5
6
7
8
9
10
11 (REF)
PULSE PERIOD S1A

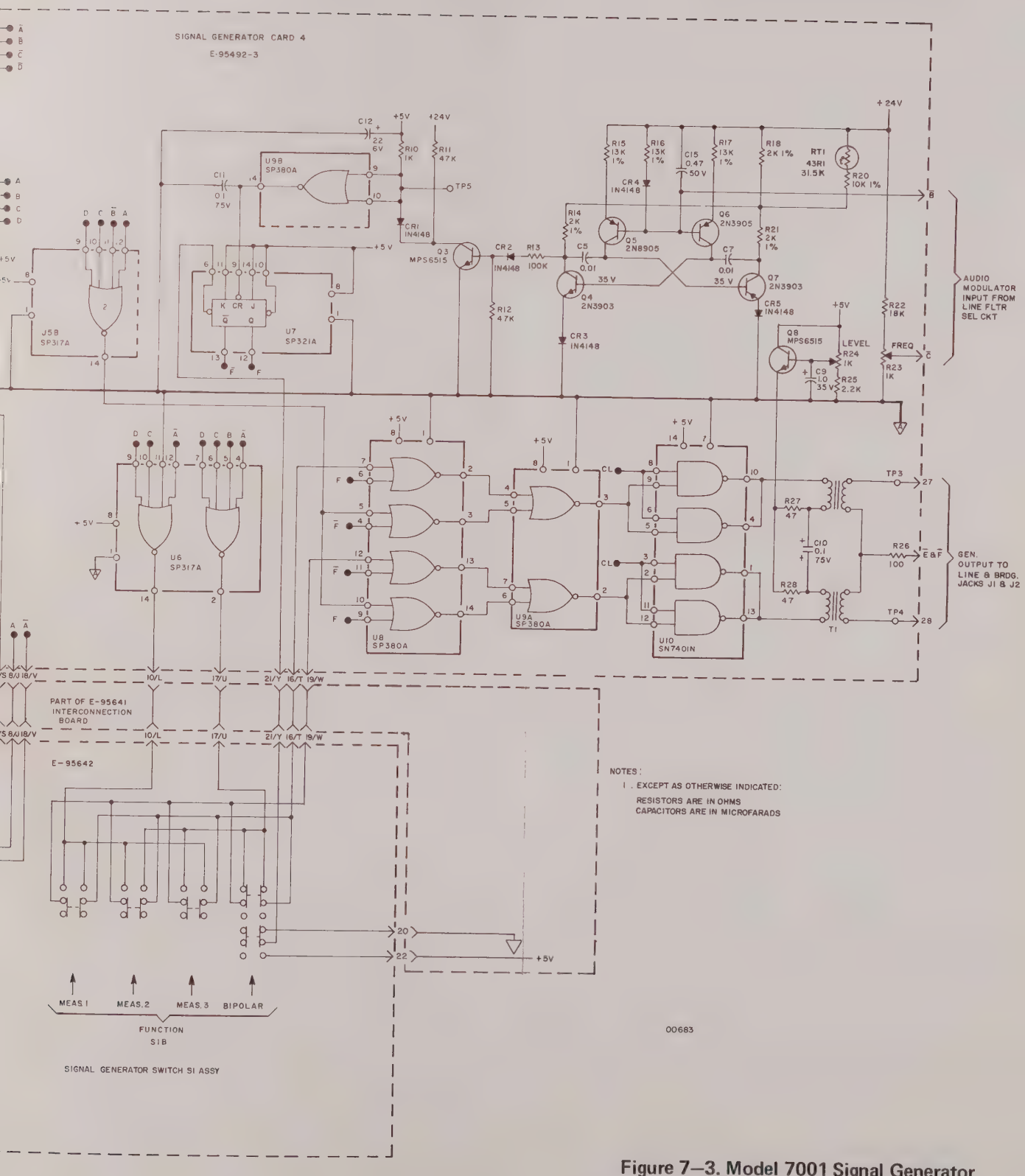
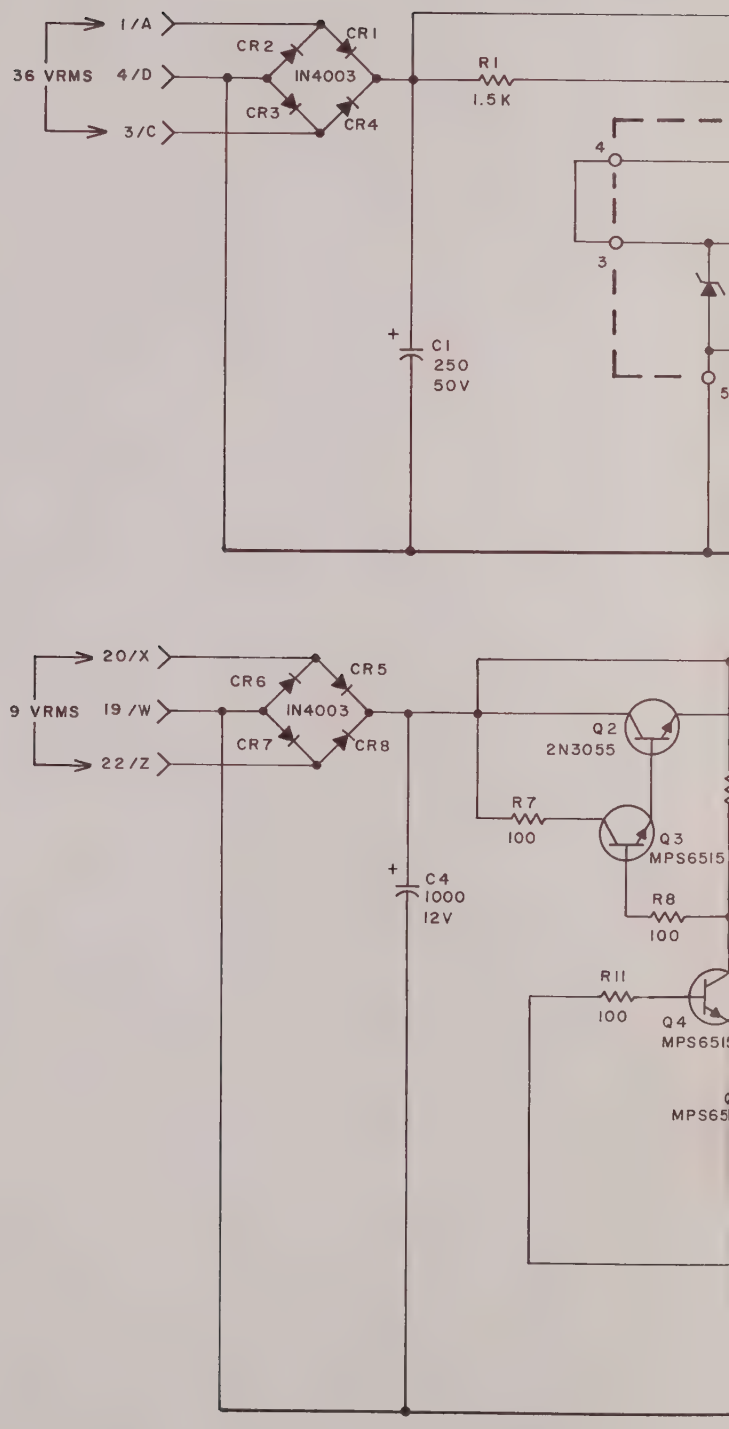


Figure 7–3. Model 7001 Signal Generator and Switch S1 Circuit, Schematic Diagram


1/A
36 VRMS
4/D
3/C
CR1
CR2
CR3
CR4
IN4003
R1
1.5K
4
3
C1
250
50V
20/X
9 VRMS
19/W
22/Z
CR5
CR6
CR7
CR8
IN4003
Q2
2N3055
R7
100
Q3
MPS6515
C4
1000
12V
R8
100
R11
100
Q4
MPS6515

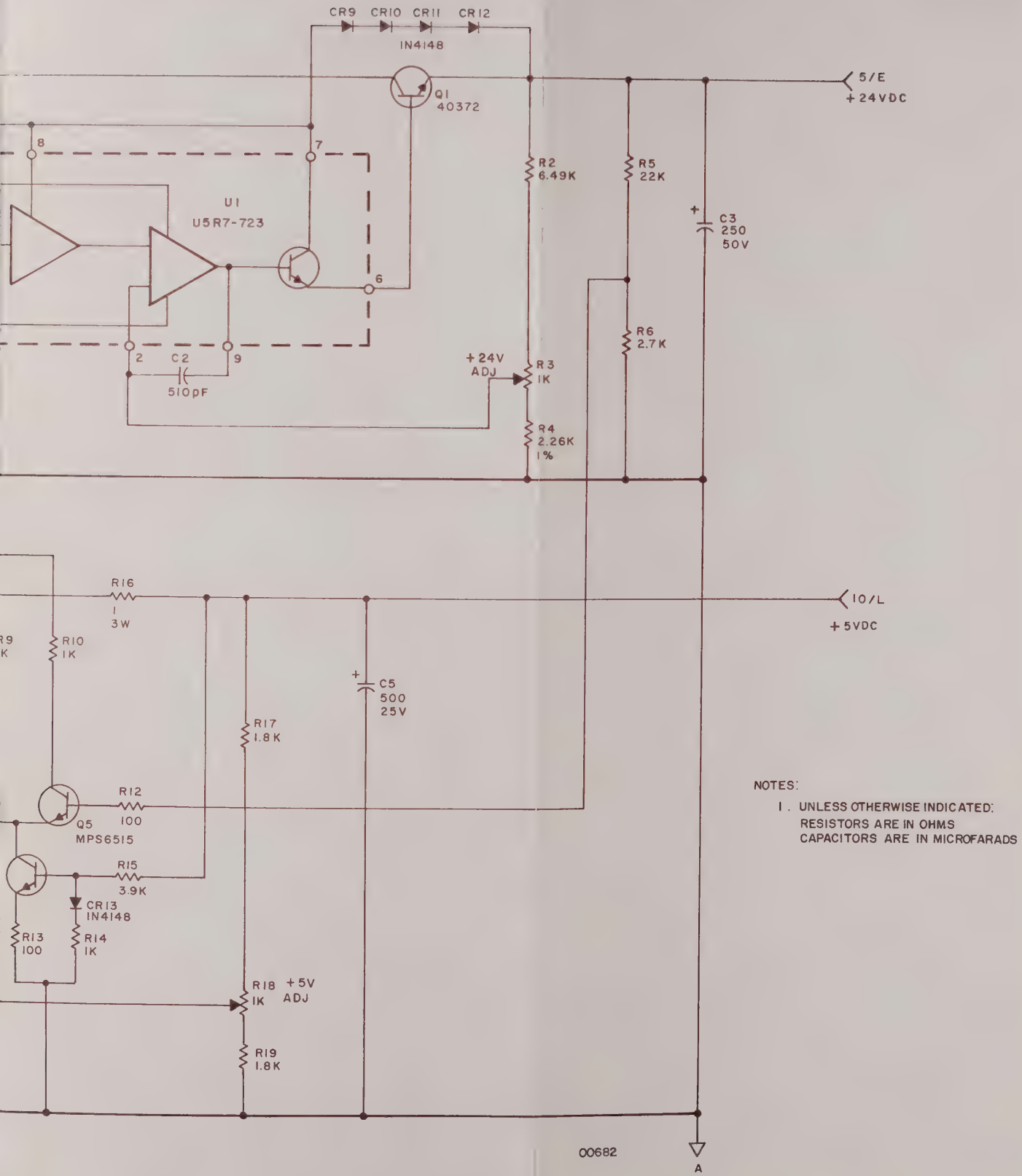
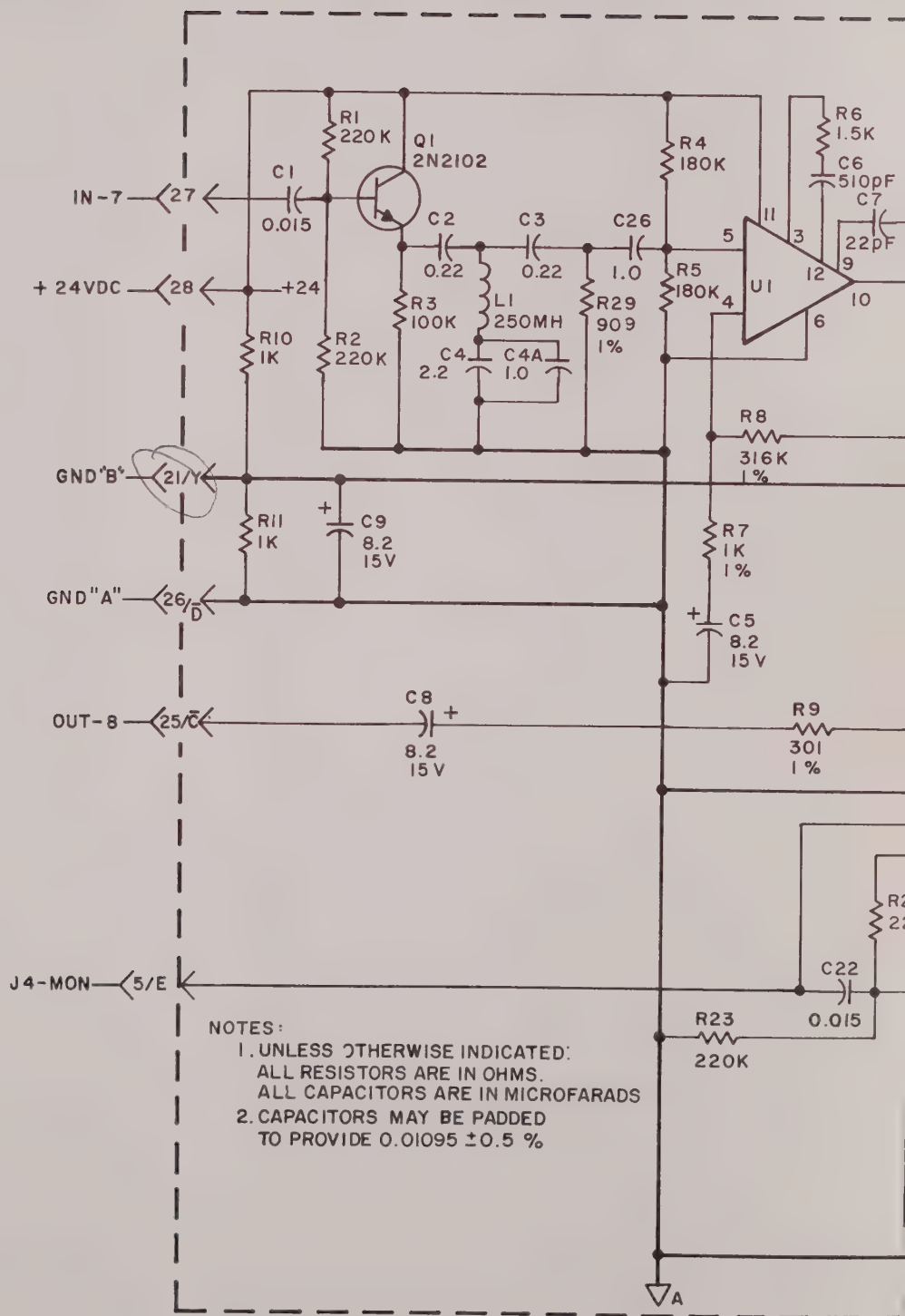


Figure 7–4. Model 7001 Power Supply Circuit, Schematic Diagram


IN-7
27
+ 24VDC
28
GND "B"
21/Y
GND "A"
26/D
OUT-8
25/C
J4-MON
5/E
R1
220K
Q1
2N2102
C1
0.015
+24
C2
0.22
C3
0.22
C26
1.0
R3
100K
L1
250MH
R29
909
1%
R4
180K
R5
180K
R6
1.5K
C6
510pF
C7
22pF
U1
11
3
5
12
9
10
4
6
R10
1K
R2
220K
C4
2.2
C4A
1.0
R8
316K
1%
R11
1K
C9
8.2
15V
R7
1K
1%
C5
8.2
15V
C8
8.2
15V
R9
301
1%
C22
0.015
R23
220K
A
NOTES:
1. UNLESS OTHERWISE INDICATED:
ALL RESISTORS ARE IN OHMS.
ALL CAPACITORS ARE IN MICROFARADS
2. CAPACITORS MAY BE PADDED
TO PROVIDE 0.01095 ±0.5 %

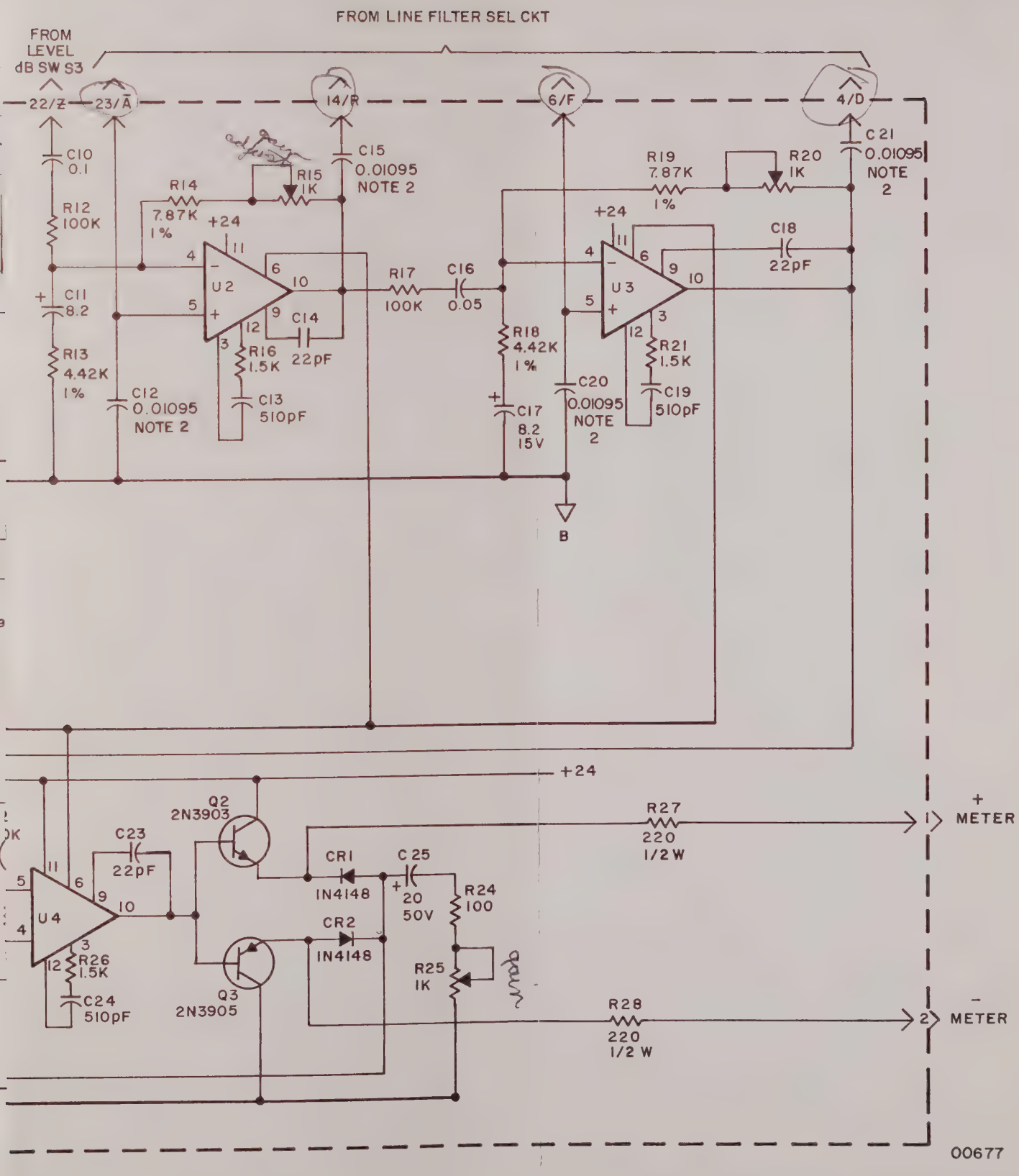


Figure 7–5. Model 7001 Filter Detector Circuit, Schematic Diagram

Model 7001 Errata Sheet

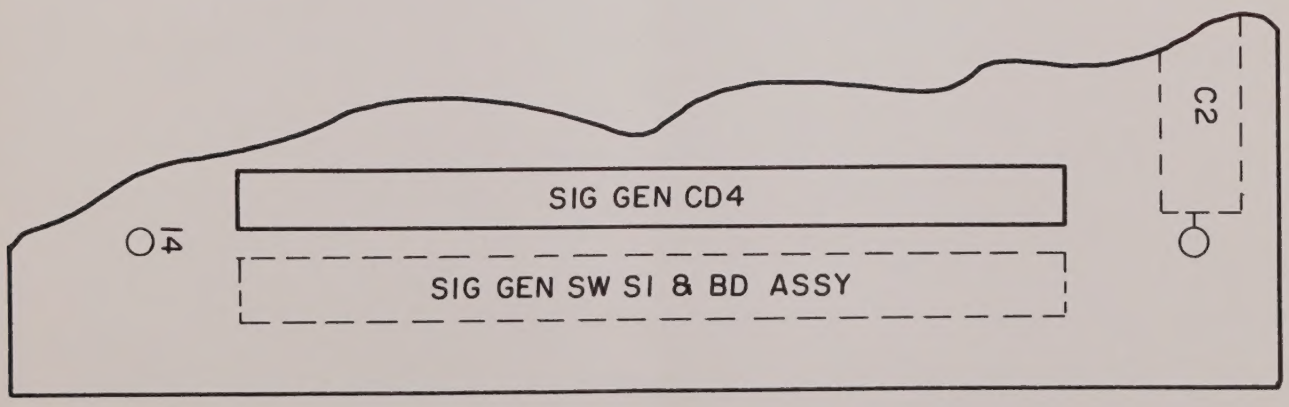
February 27, 1974

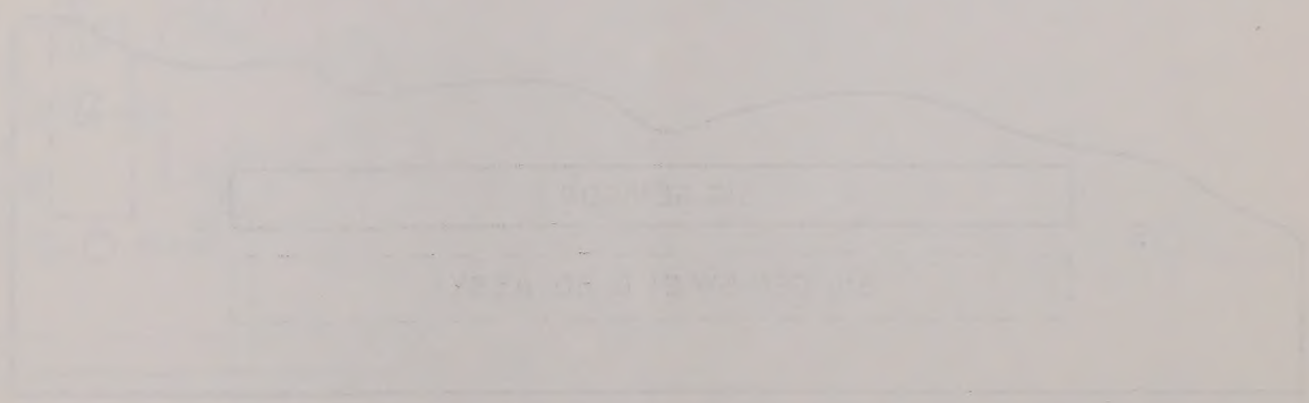
1. Paragraph 3.3, NOTE, add: Use of patch cords longer than 6 feet may cause misleading results when testing for marginally operating repeaters.

2. Paragraph 3.4c, third sentence, change to read: At position 4 the repeater is stressed to failure and an abrupt drop to between −10 dB and −15 dB will occur in the signal level.

3. Paragraph 4.12, first sentence, change to read: The basic pulse patterns------ are shown in figure 4–3.

4. Figure 6–6. Model 7001 Interconnection Board Assy, Component Location Diagram: The right end of the board assy should appear as shown in the attached partial view of figure 6–6.





84497